found only $\frac{2}{1000}$ of 1 per cent of oxide of copper, an amount so small that one would need to eat from one-half to one ton of these grapes, stems, skins, and all, to obtain the least injurious effect, and that, notwithstanding the fact that the bunches were selected from those having the largest amount of the copper mixture adhering to them.

In sample No. 2 not a trace of copper could be found. It would seem from the above that, even under the most careless use of the copper solutions, no injurious effects need be feared, and that when properly applied there will not be a trace of copper left upon the fruit at harvesting.

Apples.

Early in December, the *Pall Mall Gazette* of London, England, published an article headed "American Apples. Alarming Allegations — Are They Doctored with Arsenic?" Then the statement is made "that American orchardists use arsenic in such large quantities to protect their fruit from insects as to completely saturate it, and that the bloom or white powder found on American apples is arsenic, brought to the surface by evaporation, and, if the fruit is eaten, this should be wiped off to avoid injurious effects. That the delicate, unnatural (?) bloom of the American apples is due to arsenic, a drug that is largely used by people, especially the fair sex in America, to make the complexion fair," and other statements equally absurd and without a shadow of foundation. These statements were undoubtedly made in the interest of speculators for the purpose of injuring the sale of American apples in the English market.

To determine the amount of copper and arsenic adhering to the surface of apples (for it could not have been absorbed into the substance of the fruit) which had been sprayed three times with the Bordeaux mixture and Paris-green, twenty apples, measuring one peck, were taken to the State Experiment Station for analysis. The amount of copper oxide found on these apples was twenty-two thousandths (.022) of one grain. This equals about five ten-thousandths (.0005) of one ounce to the barrel, or requiring two thousand barrels to yield one ounce of copper oxide. The specimens selected for this analysis were those with the roughest surface, to which would adhere more of the copper solution of Paris-green than to the average apples.

Not a trace of arsenic could be detected in this analysis, as Paris-green (average samples of Paris-green contain about thirty-three parts of oxide of copper and sixty-one parts of arsenious oxide) was not used after July 1, but it was probably all washed off during the three months following, before the apples were gathered, which was Oct. 1.

When we consider the fact that probably not one fruit-grower in one hundred throughout the country used Paris-green at all, and that not one barrel in thousands came from sprayed trees, the absurdity of the "scare" becomes still more apparent.

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 Ancestry of Chalicotherium.

CHALICOTHERIUM is a genus which appears in the lower Miocene simultaneously in Europe and America, where it has been very recently discovered. It extends into the Pliocene and then disappears. It has attracted unusual attention of late, owing to the discovery by Filhol and independently by Forsyth Major that the foot-bones of *Macrotherium*, which has been considered an Edentate, really belong to *Chalicotherium*. As the teeth are wholly different from those of the Edentates, and similar to those of the Ungulates, this genus represents a very aberrant and unique family.

The only known Ungulates which present a dentition at all similar are *Palæosyops* and *Meniscotherium*. The latter is from near the base of the Eocene, and last year in analyzing its dentition I found so many very striking resemblances to that of *Chalicotherium* that I was led to suggest that *Meniscotherium* might be the long-sought ancestral form, reserving final judgment until the feet were discovered. Marsh has very recently figured the feet of *Meniscotherium* (*Hyracops*), and, upon the whole, I think they sustain the supposition that the *Chalicotheriidæ* were derived from the *Meniscotheriidæ*. There are some profound differences, but these are mainly such as separate primitive from highly modified forms. The resemblances consist in the tridactylism of both genera and the marked similarity in tooth structure. I will discuss these points in more detail in the *American Naturalist* for June.

HENRY F. OSBORN.

New York, May 5.

Detection of Artificial Gems.

I WAS much interested in reading an article by Mr. W. G. Miller on the "Detection of Artificial (Imitation) Gems," that appeared in your issue of April 29. The writer states that, 1, hardness is no test for cut stones, because cutting softens the surface; 2, that specific gravity is no test in polished stones, because polishing affects the specific gravity, and because imitation-gem manufacturers made them with a specific gravity as near that of the real gem as possible; 3, that the examination of the optical properties of cut stones is difficult (and therefore presumably impracticable) because of the many facets; 4, that fusibility is the only reliable test. I desire to advert briefly; but first let me say that the title of the article, "The Detection of Artificial (Imitation) Gems," is misleading, and confounds two totally distinct things. *Artificial* gems, such as the rubies of Fremy or the emeralds of Hautefeille, are constitutionally identical with real gems, but are the product of a chemical process, and not the work of nature; whereas imitation gems, such as paste or glass or the so-called doublets, are gems only in appearance, consisting of two or three layers of quartz or garnet and one or more layers of glass of such intensity of color as to tone down or change the quartz or garnet to the red color of the ruby or the green color of the emerald or the blue of the sapphire, according as it is intended to counterfeit one or the other of these. The same confusion is also apparent in the statement that "the ancient Egyptians and Greeks were well versed in the manufacture of artificial stones." That they produced remarkable glass *imitations* is indisputable, — witness the marvellous collections of antique pastes in the museums of Europe, — but it is safe to say that the ancients never produced an *artificial* precious stone of any kind. So much for the title.

Now, second, as to hardness as a test, let me say that I differ entirely from Mr. Miller when he states that the hardness of a precious stone is reduced by cutting or polishing. The hardness is not affected in any way, and so far from cutting impairing the test for hardness it can in point of fact be more delicately given if made on cut and polished stones with properly prepared points made of the various gem minerals than when made on the rough uneven surfaces of uncut and natural minerals. That polishing reduces the hardness by *one-tenth* is ambiguous. Though in the Mohs scale of hardness the sapphire is placed at 9 and the diamond at 10, it would be more in keeping with fact when the abrasive quality or hardness of a diamond is considered to rate the diamond at 100 or even 1,000, so great is the difference between the two. Surely the writer does not mean to imply that, simply by polishing, the hardness of the diamond is reduced to 9 (the hardness of the sapphire), or that the sapphire is reduced to 8 (the hardness of topaz), or that topaz is reduced to 7 (the hardness of quartz). It is well known that *imitation* (not artificial) gems will scratch glass, and there is no reason why they should not. Their hardness is