In anything that I may say let it be understood that I am not personal to Professor Franklin, who brings the editorial from London *Electrician* to our attention. The readers of SCIENCE need no statement from me as to Professor Franklin's qualifications.

It is too much the habit of scientists to be conservative about the application of scientific theory to commercial use. It seems to be an attitude which it is impossible to avoid; and the limitations of the individual are usually regarded as those of the science. For this reason I protest against the conclusions so hastily drawn in the present immature stage of the art of Wireless Telegraphy, viz., that it is practically incapable of any substantial extension. In this connection I quote from the *Scientific American* Supplement, the issue of August 5, 1882, page 5490, from an article called 'Electro-Mania' by W. M. Williams.

> I well remember making this journey to Boxmoor (upon one of the early steam railway carriages on the London and Northwestern Railway), and four or five years later travelling on a circular electro-magnetic railway. Comparing that electric railway with those now exhibiting, and comparing the Boxmoor trip with the present work of the London and Northwestern Railway, I have no hesitation in affirming that the rate of progress in electro-locomotion during the last forty years has been far smaller than that of steam. The leading fallacy which is urging the electro-maniacs of the present time to their ruinous investments is the idea that electro-motors are novelties, and that electric lighting is in its infancy; while gas lighting is regarded as an old, or mature middle-aged business, and, therefore, we are to expect a marvelous growth of the infant and no further progress of the adult.

This quotation is a type. Further, application of scientific theory to the affairs of man has from time immemorial been met by the scoffs not only of the ignorant (which may be borne with equanimity), but of those who ought to know better. The article by Mr. Williams was written after the birth of the dynamo, and he was doubtless incapable of distinguishing then between the old galvanic battery electric railways and those which followed the development of mechanical electric contrivances. We now know that the electric railway, so lightly characterized then, is an every-day matter involving the use of more capital than all other electric contrivances combined. The capital liabilities of the electric railways in the United States alone amount to $2,000,000,000; the telegraphs of the United States amount to $175,000,000, and the telephone systems of all kinds to a little less than $250,000,000.

Further, I protest that the entire article in the London *Electrician* is of the most unscientific character, utterly unworthy the attention of any one who tries to preserve fair-mindedness; and again that it misrepresents facts in the baldest manner; take such an example as this:

> The wireless channel of transmission will be rigorously avoided by business men, to whom a guarantee of secrecy and the certainty of a recorded message are absolutely indispensable. Wireless signals in the ether can never be secret; it must always be possible to intercept them. And messages received in no more permanent form than by sounds in a telephone are too evanescent and uncertain to commend themselves to the purposes of commerce.

And this in spite of the fact that the most enormous transactions are undertaken and consummated by telephone!

Ipse dixit predictions of this kind are unscientific. The scientist who has learned to distinguish between 'It can't be done' and 'I can't do it' has learned something which the evanescent gentleman who penned the article brought to our attention has certainly neglected. A caution against undue haste or boldness of prediction is all right; but predictions of what cannot be done are all wrong, and very much further wrong, because they neglect all the teachings of the past, and instead of adopting a Baconian philosophy would render it impossible for scientific men to obtain the means of pursuing investigations.

T. J. JOHNSTON.

SHORTER ARTICLES.

THE DISCOVERY OF TORREJON MAMMALS IN MONTANA.

LAST spring (1901), after it was decided that an expedition should be sent from Princeton

University to the region of the Musselshell river in Montana, the writer suggested to Professor W. B. Scott the possibility of finding fossil mammals in the Fort Union beds which are so well developed in the Crazy Mountains and vicinity. It was his idea that in a country where the Laramie, Livingston and Fort Union beds occur and attain a considerable thickness, the long-sought ancestors of the placental mammals of the Puerco might be found.

In the region where the camp was established, near Fish Creek, to the eastward of the Crazy Mountains, the writer had found, during the previous year, near the top of the series of rocks so beautifully exposed in this region, many fossil deciduous leaves. Many of these were in a hard, fine-grained sandstone and were excellently preserved. Below the layers of sandstone containing the best leaves were dark or gray shales in which were carbonaceous matter, plant impressions and distorted gasteropod shells, interstratified with layers of quite hard gray sandstone, which were often ripple marked. Still lower were dark gray shales with concretions, and bands or lenses of limestone containing fresh-water Bivalves and Gasteropods. The concretions are brown (ironstones) and break in angular fragments. The shales are partly soft and fine-grained and in part sandy.

During the greater part of last summer the writer was collecting for the Princeton Museum and was with the Princeton party during their stay in this region. In August, while ascending the butte from which leaves had been procured the previous year, and examining the dark shale beneath the sandstone cap, he found fragments of a tooth, which, when put together looked like the canine tooth of a mammal. Near it a premolar was found that at once settled the matter. It appears to belong to a small species of *Pantolambda*. This level was followed and carefully searched. Several teeth of *Euprotogonia* were found and fragmentary remains of one or two more mammals, besides teeth and fragments of jaws of crocodiles. This exposure was small. Afterward on another side of the butte, ravines which exposed the shales at about the same level were examined, and other bones and teeth were found.

These mammalian remains, which are now in the Princeton Museum, have been examined by W. B. Scott, M. S. Farr, and W. D. Matthew, as well as by the writer. One or two have been specifically determined and all agree that the beds belong to the Torrejon horizon. The fossils determined are:

Mioclænus acolytus (Cope),
Anisonchus close to *A. sectorius*,
Euprotogonia,
Pantolambda (?),
Psittacotherium (?).

This is a very interesting discovery, as heretofore Torrejon mammals have been found only in a limited area in New Mexico, and the beds have been searched with the greatest care, 'on hands and knees,' with a scientific zeal to know more of the peculiar mammals of this age.

The importance and interest of the discovery are doubled by the fact that everything seems to indicate that these are the Fort Union beds, the exact position of which has been uncertain. The collection of fossil leaves that was made in the summer of 1900 has been sent for with a view to the accurate determination of the species. As the Fort Union flora is a characteristic one it is confidently believed that the plants together with the mammals will settle the position of the Fort Union formation beyond controversy.

EARL DOUGLASS.

PRINCETON, N. J.

ENGINEERING NOTES.

ECCLES, a small town in England, has introduced the automobile fire-engine. It carries five men, three hundred feet of hose and standpipes, ladders, jumping sheet, etc. It is driven by an electric motor at a speed, on a smooth and level pavement, of about fifteen miles an hour. It climbs heavy gradients and is reported to be preeminently satisfactory. The self-propelled steam fire-engine has often been built, in the United States and abroad, and has sometimes proved satisfactory, though usually too heavy. The electric machine has at least one peculiar advantage in its instant