(2) That results from field and other experiments, not laid out in the metric system, be reported in technical bulletins, also in a few selected popular bulletins, in terms of the metric and English systems.

After all, such reporting of results would not be a radical departure from the usual method, for research workers are quite familiar with the metric system from their study of European literature. Also, it is comparatively easy to transpose from one system to another; for a meter is comparable to a yard and the expression, kilograms per hectare, is approximately the same as our common expression, pounds per acre.

In the platting of new experimental fields in the metric system those in charge would not only be furthering a worthy propaganda but probably would be preparing their experiment station and its constituents for an inevitable change; for many of the long-time experimental fields are expected to be used as laid out for thirty years or longer, and it is very likely that such a period will see the virtual, if not complete, adoption of the metric system in this country.

It is not necessary at this time to enumerate all the forces that are expected to bring about the adoption of the metric system or the advantages of the system in agriculture; a few will suffice. We are, as a nation, fast becoming internationally minded; a common system of measurements becomes more inportant. History is being made rapidly nowadays; events that formerly took generations for accomplishment now occur over-night. Important data and events are being published both in technical and popular publications in units of the metric system.

As against the disadvantages of readjustment in changing from the English to the metric system, we may place the advantages of saving of labor and time in calculations and of more simple and rational division or combination of field plots. The meter is a little better than the yard for distance between large intertilled crops; and the are or hectare can easily be made to contain plants numbering multiples of tens where an exact number of plants is desirable.

A. B. BEAUMONT
MASSACHUSETTS AGRICULTURAL COLLEGE

SUCCESS OUT OF FAILURE

BY how narrow a margin success is at times separated from failure is of daily experience in business affairs. It is not appreciated how it is of importance also in scientific matters. Langley died broken hearted over the criticisms and ridicule he was given about his airplane. Yet Curtiss, putting a more powerful engine in it, vindicated Langley's theories and to-day his name is preeminent in aeronautics.

Oersted, the Danish physicist, in 1819, noticed the deflection of a magnetic needle by the action of a current flowing through a copper wire near the needle. Ampère, a mathematical prodigy at 13, immediately on hearing of the experiment, amplified the subject and in a short space of time worked out the laws which have become the basis of electro-dynamics. We owe to him the word "galvanometer," the instrument which measures current strength. We now denote the unit of current strength as the Ampère, and Ampèremeters are familiar instruments.

Ampère was so profoundly impressed from his mathematical studies of the subject that he made few experiments to verify his theories. He spoke of them as demonstrated. He was as sure of his hypotheses as Leverrier, the astronomer, was from his calculations of the orbits of the planets convinced that another planet must exist in a particular region of the heavens at a certain time. The discovery of the planet named Neptune was a remarkable verification of abstract scientific theory.

So Ampère, as it is related by Rauol Pictet, the eminent Swiss physicist, who liquefied oxygen and other gases and thus paved the way for wonderful developments in chemistry, biology and physics, was induced to give an experimental demonstration of his theories. The audience hall of the Observatoire was chosen for the event and a brilliant audience gathered.

Ampère discoursed on his theories. His blackboard demonstrations were convincing.

According to theory, a coil of insulated copper wire if suspended should place itself parallel to the equator when a galvanic current is passed through it. One face of the coil should point north, the other south. These faces should be attracted or repelled by a magnet brought near, as a north pole of a magnet is attracted by a south pole of another magnet, or repelled by a north pole. Indeed, two suspended coils or "solenoids" should behave like two magnets.

Many pieces of apparatus had been built to verify the postulates of Ampère, but the firm which made them delivered them on the lecture table too late to test them out.

When Ampère, with the assurance and complete conviction that the coils would behave as predicted, made the demonstration, one after another of the pieces failed to respond. The audience, appreciating his distress of mind, gradually dispersed, and he, returning home with tears streaming down his face, so Daniel Colladon, his assistant, told Pictet, sought consolation in a game of chess with a dear friend.

Colladon, expert mechanician, immediately tested the pieces of apparatus. A common defect was found in a too great friction of the bearing surfaces to be overcome by the feeble currents employed.

He devised a new method of suspension. The ends

of the wires were made to dip into mercury held in metallic cups connected to the poles of the battery. Thus, though conduction was assured, there was practically no friction in the bearings.

Colladon tested out each piece of apparatus and at last joyfully sought Ampère near midnight, dragged him from his game of chess to the laboratory at the Collège de France, and forced him to witness the entire series of experiments successfully carried out.

Ampère then summoned his audience to a second lecture and in highly successful experiments established his prophecies and demonstrated the laws he had enunciated.

CHARLES A. DOREMUS

BREADFRUIT IN THE MARQUESAS

IN the January 18, 1924, issue of SCIENCE, page 64, Mr. P. J. Wester writes from Manila, urging an expedition to the Marquesas and other South Sea Islands, primarily for the purpose of making secure the continued existence of the breadfruit, secondarily, by a study of the varieties, to add further evidence relative to the migrations of these inhabitants of Polynesia.

He invites correspondence, hence this communication. Mr. Wester refers to statements in the romantic "White Shadows in the South Seas," and to the interesting article by Church in the *Geographic* for October, 1919, and mentions Church's prediction that in ten years from that date "there would not be a full-blooded Marquesan alive." If taken literally, this would mean that the year 1929 or 1930 will witness the extinction of all pure-blooded Marquesans, and consequently, very shortly after, according to Wester, the gradual dying out of all Marquesan breadfruit.

I have just returned from a seven months' trip to the Marquesas, and while the situation, due to the degrading influences of so-called civilization by the whites, is serious enough from a humanitarian standpoint, I can hardly share, to its fullest extent, Mr. Wester's rather doleful outlook, either as regards the complete extinction of the true Marquesan or the extinction of the breadfruit resulting from the disappearance of the full-blooded native.

The present population of all the six inhabited islands of that group of eleven, numbers, according to Mr. Frank Varney, a long-time resident on Hivaoa, about 1,000 or 1,200. Only a small proportion of these are pure bloods, most of that number being natives from the Tuamotus or the Society Islands, and many of them are half-bloods or quarter-bloods, Chinese features being very common. But I met many middle-aged, elderly and old, pure-blooded Marquesans, a fine, self-respecting race, commanding our admiration and pity. I can not believe that all these people, whom I saw in 1922 and 1923, will have vanished in 1930. It will take a longer time than that, perhaps only a few years longer, before the last pure-blooded Marquesan steps off the stage. I am quite sure that Dr. Linton,[1] of the Field Museum, and Dr. Handy, of Bishop Museum, Honolulu, both of whom have made a special study of the Marquesans, will agree with me in this.

But what is more to the point under discussion is that Mr. Wester evidently overlooks the fact that many of these pure bloods are leaving descendants, mixed bloods, to be sure, but just as much interested in the preservation of their ancient food, the breadfruit, as were their ancestors. Will not this fact tend to preserve these trees for a long time to come?

I found the breadfruit abundant on all the islands visited (fortunately, I was not obliged to eat poipoi) somewhat dwarfed when growing in the "jungle" in neglected valleys, but an enormous and noble tree when given space. The "jungle" of the Marquesas, by the way (although the islands are between 8 and 11 degrees south latitude) is by no means a tropical jungle as the latter is usually pictured, but is made up very largely of young and old and dying and dead specimens of the Fau, or Purao tree, a native hibiscus which grows to a large size, and is much used by the natives for building. One does not see, in the Marquesas, the rank, choking growths peculiar to Brazil, Central America and other really tropical countries. The appearance of the valleys in that group is more subtropical than tropical, and hence, while this growth may dwarf the breadfruit to a greater or less extent, it does not seem that it would always be fatal to its existence.

It is perhaps appropriate to describe briefly, in this connection, the agricultural conditions in Typee Vai, the valley on Nukuhiva made famous by Melville's classic "Typee." It will be remembered by those who have read his narrative that he escaped from his ship in Taiohae Bay in 1842 and was held a prisoner for many months by the cannibals of Typee. At that time he figured the inhabitants of the valley as represented by about 2,000 souls, with perhaps 2,000 more in the neighboring valley of Houmi. A period of 80 years has elapsed (not a long time historically) between his sojourn there and my visit in 1922. In November of that year I found 44 people in Typee, and 65 in Houmi, though from Pere Simeon Delmar, the charming and self-sacrificing priest at Taiohae, who is in close touch with all his people, I learned that the death rate in Typee had been normal for sev-

[1] Since writing the above I have received a letter from Dr. Linton in which he says: " . . . I certainly do not think that either the full-blooded Marquesans or the breadfruit are in immediate danger of extinction. The natives of Uapu and Uahuka are slightly on the increase and those of Fatuhiva are holding their own."