obtaining a knowledge of the British system, the adoption of the metric system would result in not only a 'saving of time, but an economy of mental effort which is incalculable.'" Lord Kelvin's argument applies with even more force to the United States. The committee on coinage, weights and measures say in their report No. 1701, April 21, 1902, made to the first session of the fifty-seventh congress: "When we consider there are over 15,000,000 school children in the United States being educated at a public cost of not less than $200,000,000 per annum, the enormity of the waste will be appreciated. In the lifetime of a single generation nearly $1,000,000,000 and 40,000,000 school years are consumed in teaching a system that as a whole does not agree with any other nation in the world, and which does not offer any advantage whatever to compensate for its complexity. Surely the children and teachers of the country are worthy of quite as much consideration as the temporary personal and pecuniary interests of some manufacturers, who have failed to furnish, by either themselves or their representatives, any evidence whatever that the manufactures of Germany or Switzerland have or did suffer any loss whatever by the recent adoption of the metric system in those countries. No one in this country has proposed to affix any penalties legal or otherwise to the use of the customary system, what we do want, and are entitled to work for as citizens, is that the government shall adopt in all its work the metric system, which is already the international system for a majority of the civilized world."

The *American Machinist,* of January 14, sums up the matter by saying what is true: "The testimony of men who have had experience in all parts of the world with both systems in the manufacture of machinery is practically unanimous, that most objections to the metric system are based upon purely *imaginary difficulties,* and that the testimony of men who have not had such experience *does not amount to anything.*

We are constantly asked what advantage will the metric system be to this or that particular business. The whole community is larger than any part of it, and is entitled to first consideration. We have shown above that one of the largest and most important activities in this country, the business of education, will be enormously benefited, and every other trade or business will also be benefited, by the increased effectiveness of mental effort in every direction which is the necessary consequence of substituting a simple and rational system for the complex, irregular and barbarous system now in vogue.

WILLIAM H. SEAMAN.

CURRENT NOTES ON METEOROLOGY.

TEMPERATURES IN THE FREE AIR.

THE valuable data concerning the temperatures in the free air obtained during the daily 'soundings' made at the Prussian Aeronautical Observatory at Berlin, are discussed by J. Homma in the *Meteorologische Zeitschrift* for October, 1904. The observations considered are those of the year 1903, and they are grouped by seasons and by good and bad days, the temperatures being summarized for different altitudes. It is to be noted that the ascents were made at different *morning* hours, between nine and twelve, and, therefore, the mean obtained is not to be regarded as accurately representing the conditions during the twenty-four hours. The vertical temperature gradients for the four seasons show a very slow decrease up to 2,000 meters in winter, and a rapid decrease in spring and summer. The average rate of temperature decrease for the year is about 1.3° per 100 meters near the surface, but decreases aloft, up to about 2,000 meters (0.9°), and then increases with altitude. The mean decrease of temperature for May, June and July between the surface and 500 meters is more rapid than the adiabatic rate of 1.8° in 100 meters.

BAD WEATHER, GOOD ROADS AND FARMERS.

PROFESSOR A. P. BRIGHAM, in the *Bulletin of the American Geographical Society* for December, emphasizes the need of good roads in the United States, and points out how great is the handicap of bad roads to farmers and to railroads. In this connection, the weather is an important factor, for when the roads are

bad, the farmer is greatly restricted in the times when he can go to market. If high prices coincide with a period of wet weather and deep mud, the farmer may lose his opportunity of getting his crops to market. In France, cold or stormy days are often used for hauling to market, but American farmers usually have to use for hauling the days which are the best for work on the farm. Railroad receipts often suffer a serious falling off when the weather is severe, and when the country roads are in such condition that farmers can not haul their produce to the train.

MONTHLY WEATHER REVIEW.

THE *Monthly Weather Review* for September, 1904 (dated November 19), contains the following articles of general interest: H. Elias, 'A New Theory of Fog Formation' (translated from the German); J. H. Spencer, 'Three Notable Meteorological Exhibits at the World's Fair' (the U. S. Weather Bureau, the German and the Philippine Weather Bureau exhibits); and the following notes: 'Meteorology in Roumania'; 'Observations for Twelve Months in Lassa' (data obtained by M. Tysbikov, a Russian, who resided in Lassa from August 15, 1900, to August 22, 1901); 'Observations at the Franco-Scandinavian Station for Aerial Soundings' (from *Comptes Rendus*); 'Wind Velocity and Ocean Waves' (from a recent paper by Cornish).

NO SECULAR CHANGE OF CLIMATE IN TRIPOLI.

VICOMTE DE MATHUSIEULX, in an account of his expedition to Tripoli (*Bull. Amer. Geogr. Soc.*, December, 1904), states it as his opinion that there is no reason for supposing any secular change of climate to have occurred in that region, although others have taken the opposite view. The Latin texts and monuments seem, to this writer, to establish the fact that so far as the atmosphere and soil are concerned, everything is just as it was in antiquity. The present condition of the country is ascribed to the idleness of the Arabs, who have allowed innumerable wells to become choked and the vegetation to perish. "In a country so little favored by nature, the first requisite is a diligent and hard-working population. The Romans took several centuries to make the land productive by damming the ravines and sinking wells in the *wady* beds."

CLIMATIC CHANGE IN THE LAKE CHAD REGION.

THE evidence from the region between the Ubangi River and Lake Chad, studied by M. Aug. Chevalier in 1902–3, is, however, believed to point towards a progressive desiccation there (*La Geographie*, May, 1904). M. Chevalier thinks it probable that a great river once flowed north across the Sahara to the Mediterranean, and that Lake Chad was merely a back water. Vegetable and animal remains indicate an invasion of the Sudan by the Saharan climate, and Neolithic relics indicate the former presence of prosperous communities. The change is not a regularly progressive one, for Lake Chad sometimes spreads beyond its usual bed as a result of several years of heavy rainfall. Since 1897 the waters have continued to fall. After a drought in 1902, Lake Fittri dried up in the following year, and hippopotami which inhabited it went elsewhere.

KITE METEOROLOGY OVER LAKE CONSTANCE.

DR. HERGESELL has contributed to a recent number of the *Beiträge zur Physik der freien Atmosphäre* an account of the observations made by him with kites on the Lake of Constance, the flights being made from a motorboat, loaned by Count Zeppelin, during the years 1900, 1902 and 1903. The observations show that inversions of temperature and of humidity frequently occur in the free air which are not exhibited by the observations made at mountain observatories.

R. DEC. WARD.

THE FIRST OBSERVATIONS WITH 'BALLONS-SONDES' IN AMERICA.

AS is known to many readers of SCIENCE, there have been despatched in Europe frequently during the past ten years *ballons-sondes*, or small balloons carrying only instruments that record automatically the temperature and pressure of the air, thus enabling the