numerous cankers similar to those on the larch. There is no reason to suppose that this locality is the only one where the disease occurs; indeed the reverse is practically sure to be the case, as it is well known that European larch was imported widely and quite generally twenty to fifty years ago. The fact that it can go onto so many different American species, which are important timber trees, makes this discovery of very serious importance to all parts of this country. Further scouting is being done to see if it is widely distributed.

PERLEY SPAULDING,
PAUL V. SIGGERS
BUREAU OF PLANT INDUSTRY AND
NORTHEASTERN FOREST EXPERIMENT STATION

THE DEFICIENCY OF ENGLISH UNITS OF MEASURE AND WEIGHT FOR SCIENTIFIC AND TECHNICAL USES

THERE are certain deficiencies in the English measures and weights which may be ascribed to historical causes and which have been imperfectly supplied by the use of troy and metric small denomination units. But the troy and metric units are not commensurable with the common or English units. The cause of this deficiency is that the English units were developed for the uses of trade, construction and manufacture, to which purposes they are perfectly adapted. The demand for technical, scientific and precision units is a relatively modern demand.

The English measures have no unit lower than the inch, whereas the metric system has seven such units, *viz.*, centimeters, millimeters, microns, angstroms, millimicrons, milliangstroms and micromicrons, of which the inch contains 2.54 centimeters, 25.4 millimeters, 25,400 microns, 254,000 angstroms, 25,400,000 millimicrons, 254,000,000 milliangstroms and 25,400,000,000 micromicrons.

Likewise the English weights have no unit lower than the ounce, whereas the troy and metric weights have 12 such units, *viz.*, drams, pennyweights, scruples, grams, carats, metric carats, decigrams, grains, centigrams, milligrams and micrograms, of which the ounce contains 7.2916 drams, 18.229 pennyweights, 21.875 scruples, 28.3502 grams, 138.449 carats, 142.045 metric carats, 437.5 grains, 2835.02 centigrams, 28,350.2 milligrams and 28,350,200 micrograms.

To supply the deficiency of our common units in the field of technical and scientific measures and weights, it is proposed that the foot be divided on the decimal scale into 100 lines and 1,000 points and that the ounce be divided into 8 drams, 100 centos and 1,000 moits, the ounce being the cube of the tenth of the foot, the dram the cube of the twentieth of the foot and the moit the cube of the hundredth of the foot of water at the maximum density. The common eight-ounce cup is the cube of two tenths or of one fifth of the foot. This will supply the deficiency of common units lower than the inch and the ounce, made necessary by modern refinements in measuring dimensions, volumes and masses.

For definitive purposes it is proposed that the foot be taken as the length of 473,404 waves of red cadmium light, that the ounce be taken as the weight of 28,316 milligrams and that new material standards or master bars and weights be constructed from these definitive values.

The avoirdupois pound was anciently regarded as equal to 7,002 troy grains. In 1844, however, after the burning of the parliamentary standards, the pound for the sake of certainty was defined by parliament as the weight of 7,000 troy grains, which produces 437.5 grains to the ounce.

The proposal to define ounce as 28,316 milligrams recognizes 28,316 grams as the weight of the cubic foot of water under the definition of the foot as 473,404 red cadmium waves. This takes 34 milligrams off the ounce, which for practical purposes may be regarded as one-half grain of 32.4 milligrams, thus reducing the ounce roughly from 437½ to 437 grains.

It is quite as legitimate to give the ounce a definition in milligrams as it was to give the pound a definition in troy grains, as was done more than eighty years ago. This is the one way to coordinate the ounce with the cubic foot of water and to correlate common volumes and weights.

SAMUEL RUSSELL
WASHINGTON, D. C.

"WASHBOARD" OR "CORDUROY" EFFECT DUE TO THE TRAVEL OF AUTOMOBILES OVER DIRT ROADS

THE interesting account of the so-called "washboard" or "corduroy" effect due to the travel of automobiles over dirt roads calls to mind an experience which the writer had last summer in the northern part of Minnesota.[1] Professor Dodd's explanation is very much to the point and on the whole I think plausible, but I am not sure that the explanation has gone far enough. In the single instance observed, my motor car was following a "grader" over a newly graveled stretch of road and, since I had myself advanced several theories concerning the cause of this

[1] Dodd, L. E., "'Washboard' or 'Corduroy' Effect Due to the Travel of Automobiles over Dirt Roads," SCIENCE 66, 1927, 214–216.