above the river and about thirty-five miles by trail west of Dedrick. The journey hither across and through the cañon has revealed a remarkable physiographic and geologic story which the party considers well worth the hardships of the journey and which will be made the subject of special papers. The region is full of archeological interest, too, through the ruins of cliff dwellers and other prehistoric peoples. In the Rio Chico branch of this cañon there is a set embracing thirty-seven houses.

From Guaynopita our course lies southward through the complex of cañons tributary to the great cañon of the Yaqui and out on to the plateau as far as Ocampo, where the famous ancient mine of Jesus Maria is located. Thence we turn back to Miñaca and there begin the long railway journey to New York.

EDMUND OTIS HOVEY.

THE METRIC SYSTEM AGAIN.

TO THE EDITOR OF SCIENCE: For the benefit of those who are clamoring for the adoption of the metric system, I desire to give an illustration of the beautiful simplicity of the system of units in vogue in the United States and Great Britain. Any of our units of measurement would answer the purpose, for they all partake of the same delightful elasticity of value. Let us take the collection of units of measure commonly denominated the gallon. In order that we may comprehend the relation of these various units to each other it is desirable to have some fixed unit as a means of comparison. As the cubic inch in use in America is not the same as that of Great Britain, and as it is desirable to use some unit of capacity that has only one value, we shall be compelled, much against our wishes, to use the liter as a unit in which to express the volume of the various members of the gallon family.

Gallon No. 1.—3.78543 liters. This gallon is variously denominated in the literature of metrology as the liquid (metric), liquid (national), metric (U. S.), Winchester, wine, and dry (metric). It is said to contain 231 American cubic inches. It is stated also that this gallon is generally used by American hydraulic engineers. It is a little difficult to be certain on this point, however, for many authors fail to state the volume of the gallon they use, in liters, and do not state whether American or British inches are meant.

Gallon No. 2.—4.4070 liters. This is the dry (national), or dry (U. S., or Br.), according to the Standard Dictionary. It is supposed to be used a good deal by tradesmen, and is sometimes referred to as a half peck. Whether it is used in England is a little difficult to ascertain, because of failure of writers to mention its volume in any fixed unit.

Gallon No. 3.—4.54346 liters. British (Mendenhall), liquid (U. S., or Br.), or Imperial gallon.

Gallon No. 4.—4.6209 liters. Legal standard dry gallon in Wisconsin and Connecticut; legal standard for ale, beer and milk in New Hampshire and Minnesota. Used in these states by tradesmen in *buying* these commodities. Also a legal standard in Maine.

Gallon No. 5.—'Proof' gallon. "This has the volume of a wine gallon containing one half its volume of nearly pure alcohol at 60° F." The number of proof gallons in a quantity of distilled liquor is found by multiplying the per cent. of proof (= twice the per cent. of alcohol present) by the number of wine gallons. Used by gaugers in assessing internal revenue tax on spirits.

I have not taken the time to verify all the references in parentheses above. Indeed, I was unable to do so with the ordinary reference books available to the student. It seemed, too, that in treating so simple and easily understood a subject, that it might be well to content myself with the above references, in order to show how simple the whole matter is, and what a delightful and satisfactory system we have, especially when exact measurements are needed. It is also probable that the careful reader will be stimulated by this hurried and incomplete account to investigate the subject further.

W. J. SPILLMAN.

NEW AMERICAN OSTRACODA.

TO THE EDITOR OF SCIENCE: In collections of ostracod crustaceans made near Greeley,

Colo., in the last four months, I find a number of specimens of *Ilyocypris bradyi* Sars. A collection made from a small stream in central Illinois in August last, consists entirely of a species of *Ilyocypris,* allied to *I. iners* Kaufmann, which appears to be undescribed.

The genus *Ilyocypris* Brady and Norman is widely distributed in Europe but has not hitherto been found in America. Including the two forms above mentioned, the family Cyprididæ is represented in North America by 44 recognizable species comprised in 12 genera. Of these, 2 genera, comprising 3 species, are exclusively American; the remaining 10 genera are represented by 13 species common to Europe and North America, and by 28 species which have been found only in North America.

A full description, with drawings, of the *Ilyocypris* from Illinois is in preparation.

Arthur E. Beardsley.
State Normal School, Greeley, Colorado,
March 17, 1905.

SPECIAL ARTICLES.

THE DISTRIBUTION OF FRESH-WATER FAUNAS AS AN EVIDENCE OF DRAINAGE MODIFICATIONS.*

As the result of careful studies of stream development, it has been well established by a number of investigators that very important changes in the arrangement of drainage lines are often produced by the capture of a portion of the waters of one stream by a tributary of some neighboring stream. It is but seldom that the actual process of immediate capture is witnessed. We most frequently see the evidence of conditions which we believe will ultimately lead to capture, or results which we believe have been produced by capture sometime in the past.

Whenever one stream succeeds in capturing a portion of the drainage system of one of its neighbors, there are certain results which must necessarily follow, just as there must have been certain conditions present to make the capture possible. By a study of the results produced it is often possible to learn what were the former relations of streams in a given region, and so prove the fact of capture, and even the approximate time of its occurrence. The evidences of drainage modifications, therefore, are of prime interest to the student of geography.

It is not my purpose to review the several results which are produced when one stream captures another, but rather to direct attention to one of the results produced, and to consider its value as an evidence that capture has occurred. At the outset it is necessary to divide the features produced by river capture into two distinct classes: (1) those features which are produced by river-capture and which can be produced by nothing else; (2) those features which are produced by river-capture, but which may also be produced by some other agency. Features belonging to the first class are of themselves definite proofs that river-capture has taken place. As an example of this type of evidence we may note the occurrence, along the former course of the stream which has suffered capture, of river-brought gravels which are so distributed that they could have reached their present position only through the agency of the captured stream. Features of the second class, however, when taken alone can not be regarded as proofs of river-capture, since, according to the basis of classification, they may also be produced by other agencies. Considered by themselves they are only of suggestive value; other lines of evidence must be appealed to before the river-capture, of which they may be the direct result, can be proved to have taken place. As an example of this type of evidence we may cite the continuation of a broad, open valley along the former course of a large, mature stream which has been diverted by capture. A similar valley may also be produced by a relatively insignificant stream, provided it is working on a band of soft, easily soluble rock, as has been the case along certain headwater branches of the James and Roanoke rivers. The existence of such a valley alone is, therefore, not conclusive evidence of capture, however strongly it may seem to suggest it.

It is well known that different streams are often marked by certain peculiarities of the

* Paper read before the Philadelphia Meeting of the Association of American Geographers.