the relief (whether contouring, hachuring or shading).

A number of corollaries follow, a few of which will be cited:

Elimination of units too small for delineation should proceed by order of magnitude. In a consistent map units of a certain order should not appear in one place and be omitted elsewhere.

Elimination of units of one order should not result in the enlargement of those of a higher order. The delineation of the latter, in order to be expressive, should so far as possible *suggest* the presence and character of the detail suppressed.

Consecutive reductions in scale should carry with them elimination of correspondingly higher orders of units.

In conclusion, it may be stated that the practical application of these principles by the topographer in the field proves to lead to no revolutionary changes in mapping methods, but on the contrary confirms the soundness of the practise, intuitively established though it may be, for the most part, of our ablest modern cartographers.

Ralph Arnold,
Secretary

Discussion and Correspondence

Geological Climates

To the Editor of Science: Dr. Lane, in his interesting paper published in Science for April 10, urges certain readers not to accept my "*ipse dixit*" but rather to await further promised demonstration.

With the added evidence given in the last issue of Science (pp. 784–5) it seems hardly necessary to point out that, so far as theories relating to terrestrial phenomena are concerned, it now rests solely with the scientists to demonstrate, if possible, that some vital flaw exists in my published work; so long as this can not be done, "most modern theories of geological climate" must certainly be regarded as "upset," *for these theories are based upon an adopted value for the temperature of space which is* (according to my demonstration) *too great by nearly three hundred degrees of the centigrade scale* at the earth's distance from the sun; and this result is practically independent of the errors of observation, for even if we should assume the measured focal temperature to be one thousand degrees in error, the provisional value (1°.5) for the temperature of space would be altered only a degree or so.

My result for the absolute temperature of space is not a speculative one; until it is proved incorrect it must stand as a demonstrated fact which is in no way dependent on other demonstrations to be given "later on."

It may not be out of place to remark that by attaching too much importance to the occasionally unguarded assertions of great authorities we are apt to retard, or to discourage, original work along lines still demanding rigid investigation. That a purely empirical formula like Stefan's should, by common consent, be honored to the extent of being called a "law," is misleading; that one of our great living authorities should refer to "The establishment of Stefan's law"[1] is still more misleading.

For myself, the most remarkable feature of this whole controversy is the fact that it has escaped the attention of scientists that, on purely theoretical grounds, the results deduced with the aid of Stefan's formula (or any other formula except the Newtonian) can not be in agreement with the principle of the conservation of energy.

J. M. Schaeberle

Ann Arbor, Mich.,
May 18, 1908

"Amethystine Blue."

To the Editor of Science: On page 825 of Science, May 22, 1908, Professor T. D. A. Cockerell calls attention to the development of the color of amethyst in glass exposed to strong light, and also mentions that this color is discharged by heat.

I am writing this brief note to call attention to the fact that the phenomena mentioned in Professor Cockerell's communication have long been known to chemists, and the explanation of same is very simple, viz., bottle glass is usually made of cheap raw materials,

[1] Science, March 27, p. 503.

and the sand used usually contains more or less iron. During the process of its manufacture the iron enters into the composition of the glass, and if present as a ferrous compound gives to the glass a green color. To dissipate the green color manganese peroxide is added to the melt for the purpose of oxidizing the ferrous iron to the ferric state. Under these conditions if only a small quantity of iron be present the pale yellow of the ferric salt will not be observed; besides, the yellow will be neutralized by the violet of the manganese salt, thereby producing a colorless glass. Now it is well known that glass decolorized with manganese slowly becomes red-violet when long exposed to light, but remains colorless when protected from the light. The phenomenon is merely an instance of chemical action in solid solutions; the effect of heat shows it to be a reversible reaction. The amethystine color is due to the presence of a manganese salt. Light promotes the development of the manganese salt; heat reverses the reaction.

HENRY WINSTON HARPER
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May 25, 1908

TO THE EDITOR OF SCIENCE: Professor Cockerell's note on the coloration of glass, published in SCIENCE of May 22d, seems to call for a word of discussion. It is not necessary to go to arid regions to observe the phenomenon. The globes of the street-lamps used in the City of Philadelphia, colorless when first put up, become in the course of two or three months distinctly violet, and in a year very strongly so. That the effect is the direct result of exposure to sunlight is proved by the fact that those surrounded by trees require a much longer time for the appearance of the color.

As to recent literature on the subject, five or six extensive papers, as well as several brief notes, have appeared within the last three years; it seems unnecessary to give a list of these here, as they are fully recorded by Mr. Ross A. Gortner.[1] The general conclusion from these various studies is that the development of the color is due to the oxidation of the manganese in the glass, although the exact mechanism of the change is not understood. Whether the tints produced in a great variety of substances by exposure to radium preparations are of the same character as those brought about by sunlight and ultra-violet light in glasses has never been definitely ascertained; but it appears more probable that they belong in the class of colloid colors, such as the red of glass containing metallic gold, the blue of sodium chloride heated in sodium vapor, and, possibly, the violet of the amethyst-quartz found in nature.

EDGAR T. WHERRY
PHILADELPHIA, PA.

THE ITALIAN ARCHIVES OF BIOLOGY

TO THE EDITOR OF SCIENCE: The publication of the *Archives Italiennes de Biologie*, founded by Professor Mosso, after having reached forty-eight volumes and its twenty-fifth year met with a grave interruption in its career, owing to the strike of the typographers at Turin, and it has been found necessary to make new arrangements for the continuation of the journal. The next number is shortly to be issued under the auspices of the new administration. The publication remains, as in the past, under the direction of Professor Angelo Mosso, with Professor V. Aducco and Professor U. Mosso as coeditors. It will still have the cooperation of biologists in sundry Italian universities. The original articles and summaries published in the *Archives* represent faithfully the progress of biology each year in Italy. The appearance of the journal will be improved, and the editors make an appeal for increased support from America. The publication has acquired a high standing and ought certainly to be among the journals taken by every university in the country. The subscription price is 40 frs. for the two annual volumes. Subscriptions should be sent to the

[1] "Some Effects of Sunlight on Colorless Glass," *American Chemical Journal*, Vol. 39, 1908, 157–162.