Such a step was taken by Dr. Blanchard in his first report, when he declared that publication in a daily newspaper could not be regarded as publication in this special sense, *e. g.*, the *Rostocker Zeitung*, though official organ of the *Rostocker Verein*.

Similarly it has been proposed that the date, of publication' should mean the date at which the printed work issues from press. This is an arbitrary ruling, and yet I fear it is not one which meets the needs of zoölogists. Let us suppose the case that a printed memoir lies for months in the desk of the author, unknown to any of his colleagues. Is it wise for us to accept a rule which shall give this withheld memoir priority over one which, though it was printed later, had already been long known to specialists? Such a course would result in a needless revision of established names and could surely raise no claim to being convenient.

But the third possibility is the one which has already won the support of the majority of zoölogists, and should, in my opinion, be incorporated into our rules. The difficulty, however, would be only half solved; we should know what the criteria are, but we should be at a loss to apply them, for the *date* of *distribution* can almost never be accurately determined. The date which the publisher uses is, as everyone knows, utterly untrustworthy. One does not need to have been specially occupied with bibliographical matters to know that the dates on the title pages of our scientific monthlies do not correspond with the time of issue; but that the 'June' number appears in May, etc. I have collected a large number of instances among journals upon whose dates we are more accustomed to rely, in which it was shown by internal evidence that the preface was written after the 'date of issue,' etc. I shall not publish this list, for it is something which everyone must have met in his own experience, and I do not wish to single out certain journals for criticism.

There seem to be but two ways to remedy this evil: either a reform must be worked in our methods of publication, or a date must be affixed by some competent agency. The former course is not likely to find favor, I fancy, with persons who have had experience in such matters. The second means seems to involve undue complication. Surely it is not necessary to maintain a recording agency for the single purpose of settling trifling disputes of priority. The case becomes, however, singularly simplified when we consider that the new bibliographical Bureau for Zoölogy* can readily undertake this task without materially increasing its labor. Indeed, it could do this simply in consideration of the greater promptness with which it would receive the publications for its index. In view of this circumstance, it seems desirable to make the following suggestion in regard to the date of publication:

The Bibliographical Bureau should record with each paper a date of approximate distribution, to be determined by the date at which the paper was sent to the Bureau. For this determination, the Bureau might (1) use the postmark; (2) deduct from the date of receipt the number of days ordinarily required for the transmission by post from the place of publication to the Bureau (this in case the postmark should prove illegible), or (3) record the date at which the the paper might have been mailed as a registered package. The ideal solution of the question would seem to be, since we have already the precedent of arbitrary rules adopted for convenience, to declare that not merely must a description be printed, it must also be placed on record. I would not be understood as advocating the incorporation of such a modification into our law priority. The practice would have to become quite general for such a step to be possible. I am, however, of opinion that it would be very desirable for the A. A. A. S. to take the necessary steps towards introducing this custom. Herbert Haviland Field.

ELECTRIC STORM ON MOUNT ELBERT, COLORADO.†

The daily course of the weather was very peculiar and singularly uniform. The mornings

* The new bibliological bureau is described in Science, N. S., II. p. 234.

† A storm experienced by Mr. Welker while occupying a triangulation station of the Coast and Geodetic Survey on Mt. Elbert, Colorado, in July, 1894. Mt. Elbert is about 14,440 ft. elevation. The camp was only one hundred yards from the summit.

H. G. O.

invariably dawned clear and beautiful. Details in distant valleys and on the horizon a hundred miles away were clearly discernible. Not a cloud could be seen above or below. About eight o'clock in the morning a faint mist would begin to make its appearance at numerous places far below the station. This would slowly ascend until at last every object below was completely lost to view. By noon the mist, now become a dense cloud, would reach the camp. It would then be difficult to distinguish objects only a few yards distant. Then the electric performance began. A loud buzzing sound pervaded the atmosphere. Everything was heavily charged with electricity. From every projecting point, from the tops of tent poles, from sharp pointed rocks, balls of electric fire shed an uncanny light. These lights varied in size from that of a small incandescent lamp to globes four inches in diameter. We could draw electric sparks from pieces of metal, from the walls of the tents and from each other's bodies. Our hair would stand on end and men's whiskers would frequently be aglow. At one time a ring of electric light encircled the rim of my hat like the pictured halos of the old masters. Every one on the summit would experience a tingling, pricking sensation and occasionally quite a violent shock. These feelings were very often decidedly uncomfortable, but they could be prevented by lying flat upon the ground. Animals upon the summit frequently became so restless from their electrified condition that it was necessary to let them go down the mountain.

These phenomena would continue for about one hour. The nature of the manifestations would then suddenly change and frequent discharges would occur. At once it would seem that the concentrated fire of all the artillery of heaven was poured upon Mt. Elbert. Lightning, thunder, hail and snow followed with such fury that it often seemed that the station must be abandoned to save the lives of the party. The flashes of lightning were almost continuous and peal after peal of thunder crashed around us like the roar of a ceaseless bombardment of which we were the unwilling targets. These fearful storms would invariably continue until nine o'clock at night. The phenomena of balls of light, hair standing on end, etc., etc., ceased at once when lightning and thunder began. Such phenomena were to be seen only when a cloud passed over the mountain's peak without producing lightning.

Although the party escaped surprisingly well, considering the violence of the assaults, considerable damage was done by the lightning. The observatory and theodolite were struck twice, the verticle circle twice, the azimuth mark once, and a rock cairn near the summit once.

The first damage done was on July 12th, at eight o'clock in the evening, during a furious hail storm. Simultaneous with a vivid and dazzling flash of lightning there came a crash of thunder that shook the mountain top itself and drove terror to every heart.

For a short time after this tremendous discharge not a sound was heard from any one. All were certain that lightning had struck the camp, but where was the damage done? The storm was still raging furiously and an examination was impossible at the time. Word passed from tent to tent assured us that all members of the party had escaped.

As usual, the following morning was clear and bright, and our steps were at once turned to the observatory and the damage done by the lightning the night before quickly ascertained. A small round hole about the size of a pea was burned through the canvas roof of the observatory. The lightning had struck the theodolite on the end of the sunshade or dew-cap and had melted a semicircular notch in its edge. Drops of molten metal had spattered over the objective and small bullet-shaped fragments of aluminum were scattered around. The anterior lens of the objective was badly cracked, probably from the heat of the molten metal, as the remainder of the objective was uninjured. The brick pier which supported the iron stand of the instrument had been partially torn to pieces and a good sized hole had been burnt in the floor. An examination of the theodolite showed that the pivots, the wyes and the foot screws were all badly burnt. The damage was repaired as well as the means at hand would permit, the rough places on the bearing surfaces being smooted with an oil stone.

Having thus put the instrument into fair working order, observations were resumed.

We had some little faith in the truth of the old saying that lightning never strikes twice in the same place, and as all signs of the storm had disappeared we now felt reasonably secure.

By noon, however, the weather again changed and we experienced almost an exact reproduction of the events of the day before.

This time the bolt of lightning struck earlier in the evening and caused somewhat greater damage. A small round hole was pierced through one of the two-inch rafters of the observatory roof. The theodolite was again struck, a second notch being melted in the rim of the sunshade. The molten metal was again spattered over the objective, and the pivots, the wyes and all bearing surfaces where two different pieces of metal came in contact were burned as before. This time the brick pier was completely shattered and an eight-inch furrow was ploughed through the rocky surface of the summit for about fifteen yards, when it disappeared beneath a snow bank. A little later upon the same evening a bolt struck the verticle circle, but did comparatively little damage to that instrument. A hole was burnt in the tent, the ridge pole was somewhat splintered, the wooden stand which supported the instrument was badly shattered, and a small furrow was ploughed through the ground. A small blister upon the circle showed the effect of the passage of the electric.

In my former experience I have found that all electric phenomena were more marked and the shocks more violent on sharp, isolated peaks. For some reason, Mount Elbert seems to be an exception, and I have come to the conclusion that there must have been something powerfully attractive in the rock composing the peak, perhaps a bed of magnetic ore.

P. A. Welker.

SCIENTIFIC LITERATURE.

The Principles of Physics. By Alfred P. Gage, Ph. D. Boston, Ginn & Co. 1895. Pp. 634, with 493 illustrations.

Thirteen years ago the author of this textbook, after many previous years of practical experience as a teacher in high school work, put forth a manual for high schools, the guiding principle of which was expressed in the words, 'Read Nature in the Language of Experiment.' He advocated the plan of putting the pupil from the outset in the position of an inductive inquirer, of placing in his hands the simplest apparatus that could be made available, and of causing the experiment, whenever possible, to precede the formulation of the truth to be apprehended.

There were already many others who believed in the extension of the objective method of instruction to all subjects in which it could be made applicable, but Dr. Gage's position was so radical as naturally to cause much healthy discussion in relation to the practical limits of the inductive method in schools. The opinion is now very generally held that, in the teaching of physics, laboratory practice should either accompany or closely follow the study of principles; but it can scarcely be said that there are very many successful teachers who now advocate the plan of trying to make original discoverers of all the students who are required to become acquainted with the elements of physics within the limited time usually alloted in a high school or college programme. The brighter pupils may indeed be so directed as to be led to the rediscovery of some long-known truths; but these are also the ones whose eagerness causes them to devour with avidity all the information they can glean from books. The prescribed experiment is performed and the corresponding deduction is correctly expressed; but the knowledge had been acquired beforehand, so that the experiment merely confirms what had already been apprehended, instead of opening out a new avenue to knowledge. Pupils whose ability is only medium, or less than average, may follow the instructions given, but are seldom able to formulate the corresponding law except under guidance. Original discovery is for them out of the question. No law of nature has ever been discovered, even by a mature investigator, as the outcome of a single experiment; and the most successful investigators are keenly alive to the difficulty of so isolating the conditions of experiment as to exclude what is confusing or misleading. No one is ready to make a discovery in physics without considerable preliminary knowledge of principles.

In the present volume Dr. Gage avoids insist-