Another expedition was planned to Mount Whitney (14,506 ft.), highest point in the United States of America, and the following letters were received:

"Dear Dr. Church, 10 Nov. 1951

Kehrlein, Gene Serr, Tarble, and I were on the summit of Whitney from about 18 to 22 July. It was a stimulating experience. We haven't worked up all our data yet, but I am fully convinced that evaporation, even at high elevations, is a small fraction of the ablation, being greatly exceeded by melt. . . .

WALTER WILSON."

"Dear Doctor, January 14, 1952

The report on our work on Whitney is being carefully worked up by Walter Wilson for the *Transactions*. Yes, you are right. Our experiment will represent conditions during the summer melting period. It showed about 90 per cent. melting and the balance pretty well equalized between condensation and evaporation. I would hate to spend a long period on Whitney's summit on any experiment—it stormed most of the time we were there, continuous high winds, rain, sleet and cold with frequent enough lightning to keep us on edge, most inhospitable. . . .

OLIVER."

[European research on this subject includes works by: Lütschg, O. *Ueber Niederschlag und Abfluss im Hochgebirge*, Schw. Wasserwirtschaftsverband, Verbandschrift No. 14. Zürich, 1926, p. 310 *et seq.* Odell, N. E. Ablation at high altitudes and under high solar incidence. *Am. Journ. Sci.*, Vol. 239, 1941, p. 379–82. Troll, C. Schmelzung und Verdunstung von Eis und Schnee in ihrem Verhältnis zur geographischen Verbreitung der Ablationsformen. *Erdkunde*, Bd. 3, Ht. 1, 1949, p. 18–29.—*Ed.*]

SIR, *Surveying on Glaciers*

While on a visit to Norway this summer, I saw a very striking example of the effect of atmospheric refraction. Quite early one morning, in brilliantly clear weather, I set up a theodolite in order to examine it, and amused myself by looking at surrounding mountain peaks through the telescope. I directed the telescope on to the summit of Galdhöppigen (the highest point in Norway), then looked at some other part of the instrument, and on looking again through the telescope I noticed that the instrument had apparently moved. Further examination disclosed that the supposed movement was the effect of change of refraction on the apparent elevation of the top of the mountain. The change was so rapid that the object seemed to move somewhat faster than the apparent movement of the Sun due to the Earth's rotation.

I was at Juvass, at an altitude of 1840 metres, on the shore of the small lake there. The line of sight passed over about three-quarters of a kilometre of ice-cold water, then for a kilometre or so over a sidelong slope of snow and rock facing east-south-east. The minimum height of the line above this surface was about 20 metres. The rest of the line was well above ground all the way, to a total length of about five kilometres.

The phenomenon described must have been caused by an exceptional combination of conditions in the presence of snow, rock and clear weather, but it points to the necessity for precaution in any work involving the observation of vertical angles. Observations should be arranged so as to minimize the effects of any changes of refraction.

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25 *October* 1952

J. E. JACKSON

REVIEWS

DAS KLIMA DER VORZEIT. Martin Schwarzbach. Stuttgart, Ferdinand Enke Verlag, 1950. viii, 211 pages, 70 text-figures.

IN 1930 Kerner-Marilaun's book *Paläoklimatologie* was published in Berlin; since then no other critical discussion of the recent progress made in the study of past climates has been published in German. Schwarzbach has attempted to fill this gap, and well he has done it. As the book is based entirely on published matter it contains nothing new for a reviewer to report; it therefore only remains to describe the contents and the method of presentation.