
Glacier Streams in Winter

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a "Kompastmacher," or maker of the small portable sun-dials with compass attached which went out in such numbers from Nürnberg and Augsburg in the sixteenth and seventeenth centuries. No such instrument from Etzlaub's hand has hitherto been known with certainty to exist. Prof. Drecker describes an instrument bearing the date 1513 which he has no hesitation in ascribing to Etzlaub, and he also prints the text of a MS. "Canon ad compastum Norenbergensem," or instruction for the use of just such an instrument, which internal evidence shows to have been certainly from Etzlaub's hand. This "canon" gives a sketch of the instrument (which is formed of a horizontal and a vertical limb capable of being folded together), and also shows that Etzlaub knew of the declination of the compass and its variation in different places. But the interesting point about the instrument of 1513 is the presence, on the outer side of the vertical limb, of a map embracing the portion of the Earth's surface from the Equator to the Arctic circle, and from the west coast of Africa to about 60° E. of that longitude, with the north at the bottom as in others of Etzlaub's maps, in which the parallels of latitude are spaced according to the principles of the Mercator projection. The map gives the names of 132 places, and was evidently intended to serve as an indicator of their latitudes, which are much more nearly correct than as given by many later map-makers. Its equatorial scale closely approximates to 1:100,000,000, from which its size may be deduced as just under 4 inches from equator to Arctic circle. Two pertinent questions are raised by Prof. Hammer, who in the first place asks for proof that the map is contemporaneous with the instrument. This seems to have been duly supplied by Prof. Drecker, who says that the script, etc., of the map quite agrees with that of the instrument (both using, e.g., the antique form of the figure 4), and points to a second very similar instrument dated 1511 *on the map itself*, which uses precisely the same latitude scale as that on the instrument of 1513. The second question cannot yet be so satisfactorily answered. Why, Prof. Hammer asks, if the principle of Mercator's projection was already known to Etzlaub, was it never mentioned by any geographical writer in the interval between 1513 and 1569? The only explanation he can suggest is the known indifference to the advantages of the projection manifested in nautical circles even in Mercator's own time. In any case it remains to be proved that Etzlaub's scale of latitude was anything but an empirical approximation to the correct Mercator scale as worked out by Wright.

GENERAL

We are glad to note that Sir Aurel Stein has been awarded the Tchihatchef Prize of the Paris *Académie des Sciences* for his geographical work.

CORRESPONDENCE

Glacier streams in winter.

26 February 1918.

IN my Address to the Geographical Section of the British Association in 1904 (printed in the *Alpine Journal*, vol. 22; in the *Geographical Journal*, vol. 24; and in the 'Annual Report of the Smithsonian Institution,' Washington, 1904) I pointed out that the streams issuing in winter from glaciers are not, as has been frequently alleged by scientific writers, the result of partial melting of the ice, but come from unfrozen sub-glacial springs. I was led to this conclusion by my own observations in winter in the Bernese Alps. From some glaciers

no water issued, from others a relatively slender and pure stream. Halfway up the Great Scheideck a copious fountain burst out through deep snow from the frozen ground, showing that such subterranean sources were still active and unfettered by frost.

Mr. Montagnier informs me that this observation is fully confirmed by M. Collet, Directeur du Service des Eaux of the Swiss Confederation, and the successor to M. Forel as the highest authority on limnology and kindred subjects. Mr. Montagnier writes: "M. Collet has found from his own experience that glaciers do not melt in cold winter weather, and that the streams issuing from them in that season come from springs. He thought he had been the first to hit on this fact, and was greatly surprised when I called his attention to your statement of it. M. Collet has had specimens of the water issuing from the lower Grindelwald Glacier in January and August carefully analyzed. The results prove beyond all doubt that the winter outflow is spring water with a large amount of mineral matter in solution, while the summer torrent consists mainly of the meltings of the ice, rendered turbid by the matter the glacier carries with it. M. Collet has in hand a paper on the subject in reply to a German savant who maintains that glacial streams in winter are a result of the internal heat of the earth."

So far as I am aware this observation continues to be ignored in most of the works and treatises that deal with glaciers. It is surely of sufficient importance to call for recognition by the writers of text-books.

DOUGLAS W. FRESHFIELD.

The "radigthe" of Symon Semeonis.

8 February 1918.

May I suggest to the author of the excellent paper on "Symon Semeonis" that the word "radigthe" or "radish" on page 80 of the *Journal* evidently refers to the horse-radish (raifort, rafano). May I also express my thanks for the pleasure which I am deriving from his most interesting contribution.

F. GLEADOW.

MEETINGS: ROYAL GEOGRAPHICAL SOCIETY: SESSION 1917-1918

Fourth Afternoon Meeting, 18 February 1918.—The Chairman presiding.

PAPER: A Transformation of the Magnetic Dip Chart. Mr. E. A. Reeves.

Seventh Evening Meeting, 25 February 1918.—The President in the Chair.

ELECTIONS.—Fred. Alexander Donnithorne; Captain Philip Hinckley, M.C., M.A.; Herbert Parrack, M.A.; Clement R. Stiles, F.R.S.S.

PAPER: Belgium and Germany in Central Africa. Comte Renaud de Briey.

Eighth Evening Meeting, 11 March 1918.—The President in the Chair.

ELECTIONS.—William Swan Arbuckle, F.R.C.I.; Charles Edward Cæsar; William Edgar Calner; Captain Edward Elgar Field; Captain Gordon Fisher, R.E.; Neil Alexander Mackinnon, F.R.C.I.; James F. Muirhead; Frederick John Nettlefold.

PAPER: My Second Year's Journey in Kansu. Mr. Reginald Farrer.