

danger of being surrounded and caught in a mass of anchor ice, and carried down helpless by the stream into the rapids.

The growth of anchor ice is exceedingly beautiful, taking place in arborescent forms resembling bushy weeds. So hard and thick does it become that it is often very difficult to thrust a sounding rod thru it. It is very granular in structure, as is shown by an examination of the masses that rise to the surface. Thru clear water the ice looks weed-like, with long tentacles rising up out of the mass. It often has immense power in lifting rocks and boulders bodily up, and many of these are carried far down stream, attached to irregular masses of ice. The spongy character of adhering frazil crystals and anchor ice causes them to accumulate slime and infusorial growths from the water, imparting a general brown color to the masses.

If the various facts of common observation in connection with anchor ice be considered, it will be seen that everything points to radiation as the prime cause for its formation. Thus, a bridge or cover prevents the forming of ice underneath. Such a cover acts as a check to radiation, and reflects the heat waves back again to the bottom. Anchor ice rarely grows under a layer of surface ice unless this is clear. It forms on dark rocks more readily than on light ones, which is in accord with what we know in regard to the more copious radiation of heat from dark surfaces. Anchor ice rarely forms under a cloudy sky, either by day or night, no matter how severe the weather, but it forms very rapidly under a clear sky at night. Anchor ice is readily melted off under a bright sun. It seems highly probable then that radiation of heat supplies the necessary cooling to the bottom of a river to form the first layers of ice, after which the growth or building up of the ice is aided by the entangling and freezing of frazil crystals always present in the water. This applies, of course, only to water flowing too swiftly for surface ice to form. The formation of a surface sheet below a stretch of open water or rapids serves to collect immense masses of the fine frazil ice.

Frequently serious damming of the water occurs by the complete stoppage of the channels under the ice. This brings about a rise of water level until sufficient weight has accumulated to enable the water to drive the barrier before it and force a channel for itself. Floods occur as a result of these winter shoves, and frequently occasion considerable damage to property along the river side. The fine frazil ice reaches great depths in many parts of the St. Lawrence River near Montreal, where it is carried under the surface ice by the swift currents of the rapids. Accumulations 80 feet deep, extending from the surface ice to the bottom of the river, were recorded by the members of the Montreal Flood Commission in 1888.

The depth of formation of anchor ice appears to be from forty to forty-five feet in the fresh waters of the Canadian rivers. Along the coast of Newfoundland it has been observed to form as deep as 70 feet in the clearer salt water. The temperature of the water on the bottom need not be exactly at the freezing point for anchor ice to form, the cooling of the bottom by radiation being sufficient to bring it to the freezing point, notwithstanding the slow conduction of heat from the earth.

#### WEATHER BUREAU MEN AS EDUCATORS.

The following lectures and addresses by Weather Bureau men are reported:

Mr. J. Cecil Alter, May 25, 1906, before the Monday Night Literary Club of Salt Lake City, Utah; also October 23, 1906, before the convention of the Utah Federation of Women's Clubs, at Park City, Utah, on "Some Inside Information on the Weather Outside", illustrated with large hand-made drawings.

Mr. H. W. Richardson, October 4, 1906, before pupils and teachers of the Blaine High School, Superior, Wis., on "The United States Weather Bureau and its Work".

Mr. J. Warren Smith, October 20, 1906, before the Engineer's Club of Columbus, Ohio, on "The Work of the Weather Bureau", illustrated.

Mr. P. H. Smyth, October 27, 1906, before the Farmers' and Teachers' Institute, Olive Branch, Ill., on "Value and Utility of United States Weather Bureau Forecasts and Warnings".

Mr. F. T. Williams, October 26, 1906, before the Church Club, of St. Paul, Minn., on "The Weather Bureau and its Work".

Mr. L. H. Daingerfield, November 19, 1906, before the physiography class of the Centennial High School, Pueblo, Colo., on "The Work of the United States Weather Bureau".

Classes from schools and academies and parties of teachers have visited Weather Bureau offices, to study the instruments and equipment and receive informal instruction, as reported from the following offices:

Boise, Idaho, August 4 and 9, 1906, students from the joint Summer School and Teachers' Institute for southwestern Idaho; also October 27, the physical geography class from the Cole School.

Buffalo, N. Y., October 13, 1906, members of Junior Division No. 2, Boys' Department of the local Young Men's Christian Association.

Cairo, Ill., September 5, 1906, a party of teachers from the Alexander County Teachers' Institute.

Columbus, Ohio, October 23, 1906, a class of special students from the South High School.

Duluth, Minn., September 13, 1906, about thirty-five students of the Freshman class, Duluth State Normal School.

Indianapolis, Ind., October 10, 15, and 17, 1906, the physical geography classes of the Shortridge High School.

Oklahoma, Okla., October 22, 1906, the physical geography class of the Epworth University Academy.

Salt Lake City, Utah, during the school year 1905-6, about five hundred students from the Latter Day Saints' College, the city graded and high schools, the University of Utah, and the district schools of near-by towns.

#### RECENT ADDITIONS TO THE WEATHER BUREAU LIBRARY.

H. H. KIMBALL, Librarian.

The following titles have been selected from among the books recently received, as representing those most likely to be useful to Weather Bureau officials in their meteorological work and studies. Most of them can be loaned for a limited time to officials and employees who make application for them.

**Asociacion de Ingenieros y Arquitectos de Mexico.**

Anales. Tomo 13. Mexico. 1905. 310 pp. 8°.

**Bastin, S. Leonard.**

The effects of civilization upon climate. (Monthly review. London. v. 24, September, 1906. Pp. 116-124.)

**Beach, Harlan P[age].**

A geography and atlas of Protestant missions. 2 vols. viii, 571; 54 pp. 18 pl.

**Belgium. Observatoire Royal de Belgique.**

Annuaire météorologique. 1905. Bruxelles. 1905. vii, 704 pp. 24°.

Same. 1906. Bruxelles. 1906. vii, 599 pp. 24°.

**Bolivia. Ministerio de Colonizacion y Agricultura.**

Estudio sobre la climatología de La Paz por Victor E. Marchant Y. La Paz. 1906. 48 pp. 8°.

**Bos, H.**

Zur Kritik der Lehre von den thermischen Vegetations-Konstanten auch in Bezug auf Winterruhe und Belaubungstrieb der Pflanzen. (S. A.- Verh. des bot. Vereins Brandenburg.) 48 Jahr. 1906. Pp. [62-90]. 8°.

**Bowker, R[ichard] R[ogers].**

Publications of societies. New York. 1899. v, 181 pp. 8°.

**Bracke, Albert.**

A la recherche de courants d'air. Mons. [1906.] 93 pp. 8°.

**Bremen.**

Deutsches meteorologisches Jahrbuch. 1905. Bremen. 1906. xvi, 126 pp. 1°.