

circulars that it has published, especially the syllabus for secondary schools in physical geography and agriculture, and the catalogs of lantern slides, arranged in sets, accompanied by printed lectures, should be known to all teachers in this country and elsewhere.

Mr. Wilford M. Wilson, Section Director, Ithaca, N. Y., reports that he will begin the regular course of instruction in meteorology at Cornell University with the opening of the second term, February 2, 1907; the course calls for three weekly periods of one hour each, and extends thru the remainder of the school year.

A typewritten syllabus of the course has been prepared, based on Davis's Elementary Meteorology. About two hundred slides have been collected for illustrative purposes, and the facilities for teaching have been considerably improved.

The following lectures and addresses by Weather Bureau men have been reported:

Mr. W. H. Alexander, January 17, 1907, an address to the physical geography class of the Burlington, Vt., High School; also January 30, 1907, at the Young Men's Christian Association Hall, Burlington, on "The Weather Bureau and its methods", with lantern slide illustrations.

Prof. F. H. Bigelow, January 22 and 23, 1907, at the University of Chicago, under the auspices of the departments of geography and economics, on "The circulation of the sun's atmosphere as the first cause of the annual changes in the weather", and "The circulation of the earth's atmosphere, and the new theory of storm energy".

Mr. F. H. Brandenburg, before the Trans-Missouri Dry Farming Congress, at Denver, Colo., on "The western limit of sufficient precipitation for successful farming without irrigation".

Mr. M. L. Fuller, during October, 1906, before the Silas Wright Grange, Canton, N. Y., on "The work of the Weather Bureau"; also January 25, 1907, before the Farmers' Institute, Canton, and January 28, before the Farmers' Institute, at Gouverneur, N. Y., on "The weather and the farmer's boy".

Mr. C. F. von Herrmann, January 14, 1907, before pupils of the Western High School, Baltimore, Md., on "Forecasting and storms", with lantern slide illustrations.

Prof. A. G. McAdie, January 30, 1907, before the physical geography class of the San Diego (California) State Normal School on "A raindrop".

Mr. W. S. Palmer, of the Cheyenne, Wyo., office, January 26, 1907, before the Trans-Missouri Dry-Farming Congress, at Denver, Colo., on "The rainfall of southeastern Wyoming".

Mr. J. Warren Smith, January 11 and 14, 1907, before the students of the special short course in agriculture, at the Ohio State University, Columbus, Ohio, on "The work of the Weather Bureau", and on "Frost warnings and protection from frost, and lightning rods"; also, January 18, 1907, at the annual meeting of the State Horticultural Society, on "The protection of crops from frosts".

Mr. J. F. Voorhees, October 6, 1906, before the Knoxville Teachers' Association, on "Weather forecasting"; also, January 14 and 15, 1907, before the short course agricultural students of the University of Tennessee, Knoxville, Tenn., on "General meteorology" and on "Practical forecasting and the work of the Weather Bureau", with lantern slide illustrations.

Mr. J. R. Weeks, January 17, 1907, at the Public Library, Binghamton, N. Y., on "The work of the United States Government, especially the Weather Bureau", with lantern slide illustrations.

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

Cairo, Ill., January 16, 1907, the class in physical geography from the Cairo High School.

Chicago, Ill., during the six months ending in January, 1907, classes from University of Chicago, Northwestern University, Chicago Normal School, Morgan Park Academy, South Division Manual Training School, Hoyne High School (two divisions), Hyde Park High School (three divisions), Bernard Moos High School, and Austin High School.

Columbus, Ohio, January 9 and 10, 1907, three classes in physical geography or meteorology.

Mobile, Ala., January 11, 1907, the class in physics from McGill Institute.

Pensacola, Fla., January 10 and 14, 1907, the class in physical geography from the local high school, in two sections.

Portland, Oreg., January 16, 17, 18, 22, and 23, 1907, classes from the local high schools.

Rochester, N. Y., January 30, 1907, the class in meteorology from the University of Rochester.

San Diego, Cal., January 23, 1907, the graduating class from the Angier Grammar School.

Savannah, Ga., January 25, 1907, the class in physical geography from Miss West's preparatory school.

Springfield, Mo., January 18, 1907, the class in physical geography from the local normal school; also, January 19, 1907, a class in physical geography from Republican, Mo.

THE CLIMATE OF YUKON TERRITORY.

By R. F. STUPART, Director of the Meteorological Service of Canada. Dated December 15, 1906.

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Meteorological observations were begun at Fort Constantine, Yukon Territory, in November, 1895, by Staff Sergeant Hayne of the Royal Northwest Mounted Police. In September, 1897, the instruments were removed to Dawson and observations were continued voluntarily by the police and by the Commissioner of the Yukon until 1900, when the duty of observing was taken over by the meteorological service, and an unbroken record has since been obtained at Dawson. Other records in Yukon in the possession of the meteorological office are as follows: Selkirk from November, 1898, to November, 1899; Tagish Lake from August, 1898, to August, 1900, and White Horse from November, 1904, to the present time. In addition to these Yukon stations, a station at Atlin, B. C., but 25 miles south of the boundary, was opened by the meteorological service in August, 1905, and will be of assistance in determining the climatic conditions of southern Yukon.

A study of all available data leads to the conclusion that while Dawson is farther north than White Horse, the climate of the former place is much more suitable for agricultural purposes than that of the latter, and in general that the northern and eastern portions of Yukon have a warmer summer climate than have the more southern portions. This is probably owing in part to the fact that the former are at a lower level than the latter, and in part to the fact that southern districts are much nearer the ocean from which the westerly winds blow; while in the north the westerly winds are from the broader land area of Alaska, and the country generally is protected by mountains ranging from 5000 to over 10,000 feet. The mean summer temperature at Dawson is fully 5° F. higher than at either White Horse or Atlin, B. C.; and while frosts seem to be frequent at the latter places in both June and August and occur occasionally even in July, in the former both June and July are practically free from frost and it is not until about August 20 that there is much danger; and very frequently September opens with as yet no frost. After the close of August the downward trend of the Dawson temperature curve is very rapid, and the winter months are probably between 15° and 20° colder than at White Horse. A summary of the general conditions of each month at Dawson will probably give the best idea of the climate.

January.—The average mean of this month at Dawson is about -24° F. and the temperature seldom rises above zero; in some years never. On twenty-one days, or about two days in three, the temperature falls to -20° F. or lower; on eleven days, or about one day in three, it falls to -40° F. or lower.

The days of -50° F. or lower are more variable in number; the average is about one in six, but in eleven years there have been some Januarys with fourteen or fifteen days -50° F. or lower, while there have been others with not one or only one -50° F. A spell of -60° F. or lower seems to occur every few years. The lowest temperature on record is -68° F. in 1901. The two coldest Januarys were those of 1896 and 1905, the former with an average temperature of -38° F. and a minimum of -65° F., and the latter with an average of -34° F. and a minimum of -66° F. The mildest January was that of 1901, with a mean of -15.5° F. and minimum of -50° F.

At Selkirk the conditions during the month are very similar to those which obtain at Dawson. At White Horse the mean is about 20° F. higher than at Dawson and the monthly range of temperature is more pronounced; comparatively mild days occur occasionally and extremely low temperatures do not occur so frequently, altho some of the lowest dips reach about the same reading as that recorded at Dawson. At Tagish Lake the mean is about 15° F. higher than at Dawson, and cold dips are not so severe.

February is usually much milder than January, the average mean temperature being about -12° or 12° warmer than January. The coldest February of which there is record was that of 1896 with a mean of -23° F., and the warmest that of 1897 with a mean of -3° F. In the former month -60° F. or lower was recorded twice, but in no other February excepting that of 1903 did the thermometer record as low as -50° F. In 1897, -31° F. was the lowest; this February was remarkable also from the fact that the temperature rose above the freezing point on sixteen days, whereas in no other year was 32° F. reached. On the average there are three days on which the temperature does not fall to zero; it falls to -20° F. on fourteen or fifteen days, and to -40° or below on four or five days. Other stations also show that February is not as cold a month as January.

In March the monthly average at Dawson is 5° F.; on an average zero is reached on nineteen days, and -20° F. on eight days, while -40° F. may be recorded, but is unusual; and -50° has not been recorded since March, 1897. The temperature in this month frequently rises above 32° F., and 50° F. is occasionally reached. The more southern stations show a mean temperature about 10° F. higher than Dawson.

April may well be termed the first spring month, as there are few days on which the thermometer does not rise above 32° F., and 50° F. is occasionally recorded. The average mean of the month is 28° F., and in some years the temperature does not fall to zero. The precipitation is usually in the form of snow, but rain sometimes falls. In this month the average temperature is very approximately the same thruout the Yukon.

May has an average mean of 46° F. at Dawson, and there are few days on record on which the temperature has remained below freezing all day; 50° F. or higher is reached on twenty-four days; 60° F. on nine days and there are many records of 70° F., notably in the years 1905 and 1906, with ten days of 70° F. in the former and seven in the latter. The average date of the last frost is the 19th.

The ice on the Yukon at Dawson usually breaks up between the 15th and the 20th, but not until a fortnight or three weeks later on Lake Laberge. The season is now further advanced in the north than in the south, and it is not until the end of August or early September that the mean temperature in the north is again as low as at White Horse or Tagish.

June is a perfect summer month, and with practically no

darkness, and nearly twenty hours of bright sunshine on fair days, vegetation advances very rapidly. Frost, while not unknown in this month, is quite unusual. The average daily maximum temperature is 70.5° F. and the daily minimum 45.2° F., giving an average mean of 57.5° F.; 70° F. is on the average reached or exceeded on sixteen days, 80° F. or higher on four days, and 90° F. was recorded in June, 1899.

July weather in Dawson is quite fairly comparable with that in the same month in southern Alberta, and with the longer days growth is probably more rapid in the former locality than in the latter. The average mean temperature is 60.4° F., with an average maximum of 72.7° F. and an average minimum of 48.1° F. There are very few days on record when the temperature did not reach 60° F., and 70° F. is reached on the average twenty days in the month; 80° F. is reached on six days, and there are a few instances of 90° F.

The August mean temperature is 54.5° F. The month opens warm, but a very decided downward trend of the temperature curve occurs after about the 15th, and there seems to be decided danger of frost after the 20th. It is still quite early autumn when the temperature of Dawson drops below that of White Horse and the southern Yukon generally; and the difference, as has been shown, becomes more and more pronounced until after midwinter.

With a mean temperature of 41.6° F. in September and an average daily minimum little above freezing, autumn is soon well advanced in Dawson, and the temperature sometimes falls below 10° F. before the month closes.

October is winter, with a mean temperature of 24.1° F., and zero readings well before its close. Toward the end of this month ice begins to run in the Yukon, but it is not until about ten days later that the river sets fast.

The November mean is -1° F.; the temperature very seldom rises to the freezing point; on twenty days it falls below zero, and on seven to -20° F. or lower, with an occasional dip to -40° F.

The December average mean temperature at Dawson is -10° F.; the highest mean in ten years was zero, and the lowest -18° F.; readings below -40° F. are usually recorded on about three days each December, and -50° F. may be reached; there are few days on which zero is not recorded. The White Horse average temperature is nearly 20° F. higher than that of Dawson.

Short as have been the temperature records in Yukon Territory, even at Dawson, those of precipitation have been shorter, covering a period of but five years at Dawson and much less at other stations.

As an approximation, however, the annual snowfall in the Yukon is about 52 inches and the rainfall 7.5 inches. July, August, and September are the months of largest rainfall, each averaging a fall of something under two inches, much of which comes with thunderstorms. Most of the snow falls late in the autumn, but occasional light falls occur up to April or even May.

The following are the hours and minutes on the 21st day of each month that the sun is above an unobstructed horizon in the latitude of Dawson: January, 5^h 55^m; February, 9^h 15^m; March, 12^h 10^m; April, 15^h 38^m; May, 18^h 51^m; June, 20^h 48^m; July, 18^h 54^m; August, 15^h 39^m; September, 12^h 10^m; October, 9^h 8^m; November, 5^h 50^m; December, 4^h 1^m. As a matter of fact, however, Dawson, together with many other of the centers of habitation, is so much closed in by mountains and hills that the actual period of sunshine is less than indicated by the figures.

It is claimed that there is little wind at Dawson in winter, and this is to a large extent true. The cyclonic areas which enter the continent from the Pacific pass far to the southward of latitude 64° north, hence barometric gradients are not usually steep.