

stances after the secretion is thrown out upon the mucous surface and has come in contact with activating substances present in other secretions with which it is mixed, the zymogen undergoes a chemical change, the nature of which is unknown, by which the active ferment is formed. Such a conversion into active ferment can also be produced artificially in many instances by treating the fresh gland with very dilute acetic acid, or it occurs spontaneously on allowing the gland to remain for some hours after removal from the body, especially if it be kept during this interval at body temperature.

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The presence of zymogens has been known now for many years, and recently great advance has been made in our knowledge of the conditions under which they are set free (see for example, enterokinase, in the article on *Pancreas, Physiology of*).

For further information on zymogens, see the article on *Enzymes*. Benjamin Moore.

ZYMOLYSIS.—This is a general term used to designate the changes produced by enzymes. See articles on *Digestion*, on *Enzymes*, and on *Pancreas*. B. M.

APPENDIX.

Alaska.
Alaska.

ALASKA.—This vast northwestern possession of the United States, extending over 16 degrees of latitude and 35 degrees of longitude, and embracing 590,884 square miles of territory, equal to nearly one-sixth of the area of the United States, exhibits a variety of climatic conditions and contrasts dependent not only upon latitude, but upon the topography of the country and the influence of the surrounding waters and currents. Two great climatic divisions can be made: southern or temperate Alaska, which can be subdivided into the Sitka, Kadiak, and Aleutian divisions, and northern Alaska or the Yukon district, embracing the vast region to the north and west of the Alaskan Mountains.

The climate of temperate Alaska is characterized by two striking peculiarities: comparative warmth and great moisture, caused by the Kuro Siwo, the "Gulf Stream" of the Pacific. This current crosses the Pacific in about latitude 45° N., and impinges on the coast of British Columbia where it divides, one portion turning northward and westward and the other southward. As a result of this condition, the temperature is greatly modified from what the latitude alone would lead one to expect, exactly as the climate of Great Britain, for example, is modified by the gulf stream. The isotherm of 40° mean annual temperature, that of the lower St. Lawrence valley, is the mean annual isotherm of the Southern Alaskan coast region. Sitka, with a latitude of 57.03°, which is the same as the latitude of Labrador on the Atlantic coast, has a mean annual temperature of 43.9° F., which is only 2.6° lower than that of Portland, Me., and a mean winter temperature of 32.5°, which is 6.9° higher than that of Portland, and only a little less than that of Washington, D. C. The extreme range of temperature is from a point a trifle below zero to 90° above. Similarly, Juneau, in the Sitka district, northeast from Sitka, has a mean annual temperature of 40.9° F. The annexed chart of the maximum, minimum, and mean temperatures of Juneau and Sitka for the year indicate still further the moderate temperature of the region.

The second peculiarity of temperate Alaska is moisture in the form of rain or fog, and in the Sitka division, which extends from Dixon Entrance to William's Sound, the yearly rainfall is from eighty to one hundred and three inches, and there are on an average but sixty-six clear days in the year. "When the sun shines, the atmosphere is remarkably clear, the scenic effects are magnificent, all nature seems to be in holiday attire. But the scene may change very quickly; the sky becomes overcast; the winds increase in force; rain begins to fall; the evergreens sigh ominously, and utter desolation and loneliness prevail." [United States Department of Agri-

culture, Weather Bureau.] The Sitka district is very mountainous, and the coast bold and steep with few beaches. The mountain sides are densely wooded, and the snow line begins at an elevation of from three thousand to five thousand feet. The prevailing winds being westerly and off the ocean, bring the moisture to the snowy mountains, which condense it. Hence it is the combination of the mountains, the prevailing moist winds from the sea, and the warm Japan current, which results in this enormous rainfall, nowhere else equalled in the United States, the annual rainfall at Sitka being more than double that on the Atlantic coast. At Sitka the rainfall for the three winter months is about thirty inches, and for the three summer months sixteen inches.

The Sitka region is the scenic portion of Alaska, visited by tourists, and here are found immense glaciers descending into the ocean.

The country is heavily wooded with spruce, hemlock, and cedar, and the vegetation is dense. On account of the sparse sunshine agriculture is difficult, but many garden vegetables are successfully grown.

In the Kadiak district, which comprises Cook's Inlet, the peninsula of Alaska, and the Kadiak Islands, the climate is similar to that of the Sitka region, but there is more sunshine and less rain, and the seasonal extremes of temperature are greater. At Kadiak the annual mean temperature is 40.6° F., and the number of days of rain or snow for ten months of the year 1899 was 133, and the number of cloudy days 124, making 257 cloudy and rainy days out of 304. The monthly mean temperature at Kadiak for eight years is as follows:

KADIAC—LAT. 57° 48'; LONG. 152° 19'. MONTHLY MEAN TEMPERATURE (DEGREES FAHRENHEIT) FOR EIGHT YEARS.

January	30.0	August	55.2
February	28.2	September	50.0
March	32.6	October	42.3
April	36.3	November	34.7
May	43.2	December	30.5
June	49.5	Year	40.6
July	54.7		

In the Aleutian district, comprising the range of Aleutian Islands, the range of temperature is much the same, as the following chart of Unalaska indicates:

UNALASKA—LAT. 53° 54'; LONG. 166° 24'. MONTHLY MEAN TEMPERATURE (DEGREES FAHRENHEIT) FOR SIX YEARS.

January	30.0	August	51.9
February	31.9	September	45.5
March	30.4	October	37.6
April	35.6	November	33.6
May	40.9	December	30.1
June	46.3	Year	38.7
July	50.6		

AVERAGE MONTHLY MAXIMUM, MINIMUM, AND MEAN TEMPERATURES (DEGREES FAHRENHEIT) OF JUNEAU AND SITKA FOR THE FOUR YEARS 1899-1902 INCLUSIVE.

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Juneau—												
Mean maximum	41.7°	43.0°	50.7°	57.2°	66.2°	73.2°	78.5°	67.7°	63.7°	58.7°	49.6°	47.6°
Mean minimum	9.5	12.0	6.0	29.5	33.2	39.2	44.0	41.7	35.7	27.0	19.3	11.0
Daily mean	29.7	29.1	32.8	40.6	46.6	56.6	57.5	54.2	49.8	43.0	35.9	32.6
Sitka—												
Mean maximum	51.0	47.3	53.6	58.0	64.7	67.7	78.5	65.2	65.0	60.0	54.0	49.7
Mean minimum	23.3	16.3	7.6	28.3	31.2	34.7	40.0	39.7	37.7	30.5	23.3	21.3
Daily mean	35.7	34.3	35.8	42.0	44.6	50.6	55.5	54.4	50.9	45.2	38.0	34.3

According to Harriman (Alaskan expedition), there were at Unalaska only 8 days in the year, during several years' record, which were entirely clear, the remaining 312 being cloudy and 271 of these were rainy or snowy.

The Yukon district, or Northern Alaska, comprises that vast region of the Yukon Valley which extends from the Alaskan Mountains to the Arctic Ocean on the north and Behring Sea and Strait in the west.

In the interior of this region the climate becomes colder and drier—extremely rigorous during the long winter and relatively hot in the short summer. As one continues north arctic conditions of climate begin. On the Behring Sea coast, north of the Aleutians Islands, the winter climate is much more severe than that of temperate Alaska on the Pacific coast, but in summer the difference is less marked. At St. Michaels, on the south side of Norton Sound, the mean summer temperature is 50° F., which is but 4° below that of Sitka; and at Point Barrow, on the Arctic Ocean, the most northerly point in the United States, the mean summer temperature is 36.8° F. Furthermore, the winter on the Behring Sea coast about the mouth of the Yukon River and the Seaward Peninsula is somewhat less protracted and severe than in the interior, although it is still long, and from October to May the temperature rarely rises above the freezing point.

Extreme cold, however, as one knows from the experience of Arctic explorers, is not detrimental to health, and at Nome, the most populous mining town in Alaska, the winter is said to be the most agreeable season of the year, in spite of the fact that in midwinter there are but few hours of daylight, the shortest days giving but about three and a half hours of dusky light. "With hands and feet warmly protected, and winter underwear and wind-proof outer clothes and exercise, one can comfortably weather a degree of cold which, in lower latitudes, would immediately transform him to an icicle. This is due to the dryness of the cold." ("The Land of Nome," by Laurie McKee, New York, 1902.)

The following table, compiled from observations of the United States Weather Bureau, gives the annual and

September or 1st of October. The prevailing winds are from the north, and severe blizzards with strong north-east gales are frequent in winter. In comparing the climate of Nome with that of the Klondike region to be spoken of directly, it may be said that in general the climate of the latter is rather more favorable than that of the former. The most trying climatic element is the continual wind.

Fifteen hundred miles in the interior, to the east of Nome City, is the Klondike region, also famed and frequented for the gold discovered there. It is reached either overland—the common passenger route from Skagway by rail for about one hundred miles by the White Pass and Yukon Railroad, and thence by steamer on the upper Yukon to Dawson—or by the longer all-water route, which is principally used for freight, by way of the lower Yukon. The distance from Skagway to Dawson, the principal city of the Klondike (in Canadian Territory), is five hundred and eighty miles.

The general characteristics of the Klondike climate are similar to those of Nome—long, extremely cold winters, with much snow and "brief but relatively hot summers." "In midwinter the sun rises from 9:30 to 10 A.M., and sets from 2 to 3 P.M., the total length of daylight being about four hours." (United States Weather Bureau report.) In June the sun rises about 1:30 in the morning and sets at 10:30 P.M., "giving about twenty hours of daylight, and diffuse twilight the remainder of the time." "During the warmer days of summer the heat feels almost tropical; the winter cold is, on the other hand, of almost the extreme Siberian region." "Yet a beautiful vegetation smiles not only over the valleys, but on the hilltops, the birds gambol in the thickets, and the tiny mosquito pipes out its daily sustenance to the wrath of man." (Heilprin, "Alaska and the Klondike.")

The following observations of mean and extreme temperatures of the United States Weather Bureau made at the Yukon River at the international boundary, about eighty miles north of Dawson, from September, 1889, to June, 1891, will indicate approximately the temperature conditions of the Klondike.

ST. MICHAELS.

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
Mean maximum (degs. Fahr.)	33.5°	38.0°	32.0°	40.5°	48.5°	62.5°	77.0°	65.0°	56.0°	47.5°	37.0°	34.0°
Mean minimum.....	-34.0	-20.0	-17.0	-20.5	-7.0	27.0	40.0	37.0	25.0	6.5	-4.0	-24.0
Mean monthly.....	-8.0	-2.3	8.9	19.9	33.1	46.3	53.6	51.9	43.9	30.5	15.6	4.8	26.1°
Extreme maximum.....	44.0	41.0	43.0	46.0	57.0	75.0	75.0	69.0	69.0	54.0	42.0	45.0	75.0
Extreme minimum.....	-47.0	-41.0	-39.0	-27.0	-2.0	22.0	33.0	32.0	18.0	3.0	-24.0	-43.0	-47.0
Mean number of rainy and snowy days.....	7	4	6	8	9	9	12	14	14	11	9	5	108

monthly mean temperatures and the extremes for St. Michaels, which is on the southern side of Norton Sound; it also may be utilized for ascertaining approximately the yearly temperature of Cape Nome, which is one hundred and fifty miles distant on the northern shore of Norton Sound, at its junction with Behring Sea. In the same table will be found a statement of the mean number of rainy and snowy days. As will be seen, the rainfall is very light, and is about fourteen inches annually, a striking contrast to that of Southern Alaska.

YUKON RIVER AT INTERNATIONAL BOUNDARY, LAT. 65°, LONG. 141°.

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
Mean temperature (degs. Fahr.)	-17.0°	-10.0°	7.0°	24.0°	45.0°	57.0°	60.0°	52.0°	39.0°	31.0°	3.0°	-16.0°	23.0°
Extreme maximum.....	25.0	37.0	38.0	55.0	74.0	84.0	87.0	74.0	66.0	52.0	39.0	17.0	87.0
Extreme minimum.....	-60.0	-35.0	-45.0	-26.0	8.0	30.0	35.0	31.0	14.0	4.0	-35.0	-49.0	-60.0

One cannot be sure of reaching Nome by sea much before the middle of June on account of the ice in Behring Sea, or of getting away from there after the latter part of

From observations made on the Yukon, not far from the site of the gold discoveries, by the United States Coast and Geodetic Survey for a series of six months, the following temperatures are noted: From October, 1889, to April, 1890, the mean temperature was as follows: October, 33° (above zero); November, 8° (above zero); December, 11° (below zero); January, 17° (below zero); February, 15° (below zero); March, 6° (above zero); April, 20° (above zero). "The daily mean temperature fell and remained below the freezing point (32° F.) from

November 4th, 1889, to April 21st, 1890, thus giving one hundred and sixty-eight days as the length of the closed season. The lowest temperatures registered dur-

ing the winter were: 32° below zero in November; 47° below zero in December; 59° below zero in January; 55° below zero in February; 45° below zero in March; 26° below zero in April. "The greatest continued cold occurred in February, 1890, when the daily mean for five consecutive days was 47° below zero. The weather moderated slightly about the 1st of March, but the temperature still remained below the freezing point. Generally cloudy weather prevailed, there being but three consecutive days, in any month, with clear weather, during the whole winter. Snow fell upon one-third of the days in winter, and a less number in the early spring and late fall months. The change of temperature from winter to summer is rapid owing to the great increase in the length of the day." (Bulletin of the United States Weather Bureau, July 29th, 1897.)

Harriman (Alaska expedition) says that the mean temperature of the warmest month on the Yukon, in latitude 64° 41', was 4° higher than at Sitka over five hundred miles farther south; but while at Sitka the extreme range of temperature is 90°, it will be seen from the above table that on the Yukon it is 147°.

"With a claim to have seen many distant lands," says Professor Heilprin, "I can truthfully say that never before had it been my fortune to experience such a succession of wonderful summer days as during my stay in the region about Dawson. From August 6th to September 20th, barring three days of partial rain, and perhaps a fourth of cloudiness and mist, the weather was simply perfection—a genial, steady, mild summer, with a temperature rising at its highest to about 80° or 82° F. in the shade."

The average annual rainfall is given as from ten to twenty-five inches, and, according to the authority just quoted, the weather is bright and sunny, and there is practically no fog. "There is more sunshine," says Harriman, "in a month (in the interior) than at Sitka in a year."

Such a climate, although severe, is said to be a healthy and invigorating one to most people, for the cold is uniform and dry, and there is very little wind, a contrast, in this respect, to Nome. In a report by Capt. W. P. Richardson, Eighth Infantry, U. S. A., the fact is stated that when the thermometer rises to zero, as it sometimes does in midwinter, it is too warm for comfortable travel. The best temperature, he states, is from 10° to 25° or 30° below zero. "With this temperature the sleds run easily, dogs work with spirit, and one can exercise with the warm clothing necessary at all times in Alaska without discomfort." The ground is frozen deeply, and in the warmest season only thaws to the depth of a foot or two.

The vegetation in the Klondike region is, comparatively speaking, far more luxuriant than at Nome, where it is of arctic character, chiefly mosses and lichens, and the tundra or thick peat moss, or grass which renders foot travelling wearisome and slow. In the Klondike region the country is well wooded, principally with the spruce, although the aspen, birch, balsam, and poplar are found, and this region of forest extends with breaks several hundred miles northward of Dawson. In the summer the country is green and variegated, with a rich flora. Grass grows abundantly, and all the hardy vegetables are said to grow without trouble. Grain, vegetables, and fruit have been raised in small quantities. The native strawberry is found in many parts of the Yukon valley, and so also are various native berries, especially the blueberry. In the Yukon valley, near Dawson, celery, lettuce, potatoes, turnips, etc., have been successfully grown, as well as oats and wheat, and this in a latitude which runs through Greenland and Iceland! Of course such results would be impossible were it not for the fact that the summer days, though few, are very hot and the sun is almost continually above the horizon.

Fish, furs, and gold are the principal industries of Alaska. The discovery of gold has naturally attracted the most attention, but the fisheries form one of the most important industries, and next in importance to the fur trade is the salmon industry. The population was 63,592

at the census of 1900, of which number over 45,000 were males and about half were whites.

Nome City is the largest town, with a population of over 12,000, and next comes Skagway, with a little over 3,000. Dawson, the principal town of the Klondike region, in Canadian Territory, had in 1899 16,000 inhabitants.

The testimony is somewhat conflicting regarding the mosquitoes, but they are apparently pretty abundant, and at certain times and places constitute a veritable scourge. The gnats are also very annoying.

The accommodations, especially in the mining towns, are naturally not of the best, and are expensive; still, any one possessed of robust health need not be deterred either by the climate or by the poor accommodations from a journey to, or a permanent abode in, Alaska. The steamer accommodations from San Francisco, Seattle, or Vancouver are by some lines quite satisfactory. A summer excursion to the southeastern coast of Alaska—the iceberg region—is a favorite one.

References.—Various government reports from the Interior Department; Department of Commerce and Labor; Department of Agriculture, and the Weather Bureau; yearly reports of the governor of Alaska; Harriman, "Alaska Expedition"; Heilprin's "Alaska and the Klondike"; "The Land of Nome," by Laurie McKee; "The Pacific Coast Pilot," and many other special works. Edward O. Otis.

ARSENIC, POISONING BY.—It has been estimated that of all the recorded deaths due to poisoning, at least three-fourths have probably been due to arsenic in some form. So powerful a factor has this poison proved in the history of the world's progress, and so instructive are the records, that a glance at the past seems necessary.

The knowledge of the poisonous nature of the compounds of arsenic seems to have first come from out the mysterious East. Long before the dawn of written history the Asiatics, the Egyptians, and doubtless other Eastern peoples, seem to have been well acquainted with the sulphides of arsenic and probably also with the method of preparing the trioxide by roasting arsenical ores. The oldest of the manuscripts and papyri dealing with materia medica, etc., which have come down to us (the famous Leyden collection), include the name "arsenic" in the list of substances with medicinal or poisonous action. We are ignorant, however, of the part this substance played in the world's drama prior to the first century A.D. But about this period the writings of Dioscorides and of Olympiodorus caused the method for the preparation of the oxide to be well known and its poisonous property to be well understood. From this time on, arsenic trioxide, because of its being colorless, odorless, tasteless, and insidious in its action, became a factor in history. Professional poisoners soon appeared on the stage and succeeded in developing poisoning into an art—if this be not a prostitution of this term. The first of these artists in crime seems to have been Locusta. Attached to the court of Agrippina she caused the death of Claudius by means of arsenic; later, as the tool of Nero, she accomplished the death of Britannicus and threw Rome into consternation and terror. Put to death by Galba in 68 A.D., she was succeeded by an adept disciple, Canidia, who administered arsenic to a large number of victims. From this time on, Italy proved a hotbed for schools of crime in which arsenic was always the chief agent. Until the thirteenth and to a certain extent to the fifteenth century, murder by means of arsenical preparations knew no bounds and overflowed all Europe. Standing forth among the many historical lesser criminals, we have Charles the Bad, King of Navarre, whose remarkable letters patent (fourteenth century), giving directions for the poisoning of his brothers and uncles by means of white arsenic to be mixed with food or wine, are still extant; the Pope Alexander VI., murdering out of revenge those of his cardinals who disagreed with him, and the wealthy cardinals, his friends, in order that he might seize their property, meeting death himself through the