

ALTITUDE OF MOUNT RAINIER DETERMINED BY COMPUTATION

Crest, the Topmost Peak, is 14,528 Feet Above the Sea—Figures That Cost the Life of Edgar McClure, Scientist.

LOCATIONS OF POINTS ON MOUNT RAINIER—	FEET.
Eatonville	870
Kernahan's Ranch	1,880
Longmire Springs	2,850
Mazama Camp	5,932
Camp No-Camp	12,700
South Side Crater	14,275
Columbia Crest	14,528

These altitudes, determined by the lamented Edgar McClure, are likely to endure as the standard record of heights on Mount Rainier, particularly with reference to Mazama Camp and the summit, Columbia Crest.

Of these localities it is interesting to note that Camp No-Camp, which is at the summit of Gibraltar Rock, was given its name by Prof. McClure. Prior to that time it had been called Camp of the Stars.

Take the following article from the Post-Intelligencer, one of the most enterprising papers on the coast.

Of the most tragic incidents in the history of science was the death of Edgar McClure, who lost his life on Mount Rainier July 27, 1897. As he died, the chair of geology in the University of Oregon, personal tastes, instincts and ambitions were essentially scientific. In addition to this, he was a member of the Mazamas, whose purposes in the scientific exploration have lent a cumulative interest and a cumulative value to the geography of the Northwest. The particular expedition with which Professor McClure was associated when he met his untimely end, left Portland with the distinct

Professor McAllister's statement, was not only hallowed by scientific associations, but was prepared for its high mission more lovingly and assiduously than a favorite racer would be groomed for the course. Twice had it looked upon the beauties of the Columbia river from the summit of Mount Hood, and on three other lofty peaks it had served its silent but efficient ministry to the cause of science. On one of these, Mount Adams, the altitude determined with this instrument was accepted by the United States government, yet a new tube was fitted for it. Professor McClure himself preparing the mercury by distillation, and seeing to it that the vacuum was exceptionally perfect. That the barometer was most carefully handled at the time of observation will fully appear from the record below. It was suspended by a ring and allowed to hang until it had assumed the temperature of the surrounding air before being read. Not only this, but all the subsidiary phenomena which could have the slightest bearing on the result were laboriously determined. Concurrent observations were made at all salient surrounding stations, while for a week before the date of actual observation Professor McClure himself had made numerous observations both of pressure and of temperature at various sub-stations in the vicinity of Mount Rainier, and his collaborator had secured simultaneous observations from Seattle and Portland. Utilizing as he did the fervor of the pioneer explorer with the accuracy of the laboratory chemist, Professor McClure was peculiarly fitted to obtain a result which bids fair to become historic. The broken barometer, a cut of which appears herewith, will appeal powerfully to every lover of science. If, as has been suggested, a monument



of making the ascent of Mount Rainier, recording such geographical and topographical observations as might be feasible. As a member of the expedition, Professor McClure was in charge of the elevation department and set before himself a somewhat more distinct and definite purpose, viz: to ascertain by the most approved methods and with the most carefully graduated instruments the true height of the famous and beautiful mountain. How well he accomplished this purpose will best appear in the subjoined letter from Professor E. H. McAllister, his friend and colleague, who with infinite care and sympathetic zeal has worked out the data, which would otherwise have been undecipherable not only to the general public, but to the average scholar. As he himself said when he completed his arduous task: "I have done everything possible to wring the truth from the observations. In my judgment they should become historic account of the probability of their accuracy."

To the accomplishment of this object Professor McClure brought all the resources of a ripe culture and ardent, vigorous young manhood. His plans were all laid with the greatest care. To him their fulfillment meant not so much a personal or tribal triumph, as a victory for science. The very instrument on which he most relied for accurate determinations, as will be seen from

bers of the expedition, was the immediate cause of his death. He carried it in a double case, a wooden one which his own hands had constructed, and outside of this a strong leather tube. From this latter stout thongs enabled him to strap the instrument on his back, much as a pioneer huntsman would wear his trusty rifle. While standing on the perilous ledge whence he took the fatal plunge, he turned to sound warning to his companions whom he was leading in a search for the lost pathway down the mountain. "Don't come down here; it is too steep," he called, turning so as to make his voice more audible. These were his last words. He vanished in the night and the abyss. It is likely that the tube, three and a half feet in length, caught as he turned and helped to hurl him from his precarious footing.

figured out the extreme height of Rainier at 14,519 feet. The value of Professor McClure's determination will be heightened rather than lessened by the peculiar difficulty and rareness of scientific work in an unexplored territory and from a base which has not all the appurtenances and advantages of the older scientific stations of the East and of Europe. In this respect his work is like that of Agassiz and of Audubon. Not unlike those great masters was he in his intense and lofty devotion to science. Not unlike them he wrought with rigid accuracy where others had worked almost at random. Not unlike them he aroused among his friends and students the conviction that he was a born high priest of nature, whose chief mission in the world was to reveal her secrets to mankind. He died as he always lived—on the mountain top.

In transmitting his results to Horace McClure, brother of the deceased scientist, Professor McAllister brings to a proper close a labor of love, one that is as creditable to his scholarly culture as it is to his unselfish and devoted friendship.

HERBERT L. BRUCE.

Letter of Transmission.

University of Oregon,

Eugene, Or., Oct. 23, 1897.

Mr Horace McClure—Dear Sir: I herewith transmit to you for publication my report upon the observations of your late brother, Professor Edgar McClure, relative to the altitude of Mount Rainier, the data having been referred to me for reduction and computation by yourself and by the officials of the Mazama club.

It is but just to myself to say that the long delay in the appearance of this report has been caused by unavoidable difficulties in the collection of subsidiary data; in particular, the comparison sheet showing the instrumental error of Professor McClure's barometer, could not be found until the 9th of this month, when it was discovered among some effects left by him in Portland. A further delay has been occasioned in obtaining a few other important data. A report approximately correct could have been made some time ago, but I felt it was due to the memory of Professor McClure's reputation for extreme accuracy that no report whatever should be published until I was able to state a result for which I could vouch as being the very best that the observations were capable of affording.

The thanks of all concerned are due to Mr B S Pague, director of the Oregon weather bureau, for numerous courtesies and for his efficient aid in the collection of data.

Very respectfully,
E H McALLISTER,
Professor of Applied Mathematics.

The Result.

For the benefit of those not interested in the scientific details of this report, it may be stated at once that the summit of Mount Rainier, according to Professor McClure's observations, is 14,528 feet above sea level. The altitudes of various sub-stations occupied en route will be found further on. An account of the data, with description of the methods employed in reduction and computation is given, to indicate the degree of reliance to be placed upon the result.

The Principal Observation.

The principal observation to which this report refers was made by Prof. Edgar McClure, of the University of Oregon, on the summit of Mount Rainier, Washington, July 27, 1897, at 4:30 p. m., Pacific standard time. The observation consisted of a reading of Green's standard mercurial barometer, No. 1612, together with readings of attached and detached thermometers. It appears that the barometer, which was suspended by a ring at the top, was allowed so to hang until it had assumed the temperature of the surrounding air, before being read; that the sky was clear at the time; and that the place of observation, the highest on the mountain, is designated as Columbia Crest.

The barometric reading, corrected for instrumental error and temperature, was 17.708 inches; the air temperature was 29 degrees Fahrenheit.

Subsidiary Observations.

Concurrent observations were made at 9:30 a. m. and hourly during the after-

noon by the regular observers at Seattle, Portland, Fort Canby, the University of Oregon at Eugene, Roseburg, and one observation at Walla Walla at 5 p. m.

In addition to these, during the week preceding the 27th, Prof. McClure made numerous observations both of pressure and temperature at various sub-stations in the vicinity of Mount Rainier, and simultaneous observations are furnished from Seattle and Portland.

Reduction of Observations. At the very outset of the work of reduction it was evident that Eugene and Roseburg were under an area of relatively low barometric pressure on the 27th, representing atmospheric conditions that did not prevail in the region of Mount Rainier. I therefore rejected the observations at both these places, using only those at Seattle, Portland, Fort Canby and Walla Walla. The strategic position of these four points will be seen at once by a glance at the accompanying map.

The method followed in making the reduction was, in brief, to deduce from the observations at the four base stations surrounding the mountain the actual atmospheric conditions prevailing in the immediate region of the mountain.

More specifically, the process consisted in determining the atmospheric pressure and temperature at an imaginary sea level vertically under the mountain, which level I shall subsequently call the "mean base."

In this I was greatly assisted by a careful study of the daily weather charts issued by the government. Mr. Pague having kindly loaned me his official file for July. I thus practically had at my disposal observations from all the important points on the Coast, both before and after the principal observation.

With due regard to the position and direction of the isobars, and giving proper weight to the observations at each of the four base stations, I finally deduced 30.130 inches as the value of the pressure at the mean base which best satisfied all the data. It ought to be said, perhaps, that this result does not depend upon my judgment to any appreciable extent, but was legitimately worked out from the observations and isobaric lines.

In determining the mean temperature of the air column extending from the mean base to the summit of the mountain, the observations made by Prof. McClure during the previous week in the vicinity were so numerous and well timed as to leave far less than the usual amount of uncertainty. Making due allowance for the moderate elevations of the stations, these observations show clearly that the temperature about the mountain at that time followed that of Seattle very closely, and was also not much different from that of Portland, but departed notably from both the heat of Walla Walla and the low temperature of Fort Canby. Allowing proper weight to these facts, the observations at the

base stations, with that of Prof. McClure at the summit, gave 49 degrees F. as the mean temperature of the air column.

I regard the method of reduction outlined above as possessing decided advantages over any other that could be applied to the problem in hand; especially because it admits of using the local barometric readings with freedom and elasticity, thereby increasing the reliability of the result to a marked extent.

The Computation.

The reduction made, there remained for the final calculation the following data:

Barometric pressure at summit of Rainier, 17.708 inches

Barometric pressure at mean base, 30.130 inches

Mean temperature of air col., 49 deg. F.

Latitude of Mount Rainier 46 deg 48 min.

In making the calculation I used the amplified form of Laplace's formula given in the recent publication of the Smithsonian Institution, with the constants there adopted. Perhaps for the general reader it may be important to remark that this formula, besides the barometric pressures, contains corrections for the temperature of the air column; for latitude, and for the variation of gravity with altitude in its effect on the weight of the mercury in the barometer; for the average humidity of the air; and for the variation of gravity with altitude in its effect on the weight of the air. I used the latest edition of the Smithsonian tables, but afterward verified the result by a numerical solution of the formula—the altitude being, as stated at the beginning, 14,528 feet above the sea level.

It should be noted as an evidence of the great care and foresight with which Professor McClure planned his work and the success with which he carried it out, that the result of his observations agrees within nine feet with that obtained by the United States Geological Survey in 1895, using, as we may suppose, the most refined methods of triangulation—the latter estimate being 14,519 feet. In connection with so great an altitude, nine feet is an insignificant quantity, and the close correspondence in the results of the two methods of measurement is truly remarkable. I am not inclined to regard it as accidental, but as due to the most careful work in both cases.

Having a full knowledge of all the available data, I am perhaps better prepared than anyone else to pass judgment upon the result set forth; and while it would be folly to give a numerical estimate of the probable error, I feel justified in saying that no single barometric determination is ever likely to prove

more accurate than this one of Prof. McClure's. At any rate, the outstanding error is now too small to justify the hazard of any future attempt.

Altitudes of Sub-Stations.

From the observations made by Prof. McClure while en route to the summit, together with simultaneous records from Seattle and Portland, the following altitudes are obtained:

Feet above sea level.

Eatonville, 870

Kernahan's ranch, 1,880

Longmire springs, 2,850

Mazama camp, 5,932

Camp-No-Camp, 12,700

South side Crater Rainier, 14,275

The data in these cases were not sufficient to admit an elaborate working-out of the altitude, so that the figures given are to be regarded as rather close approximations, except in the case of Mazama camp, the altitude of which rests upon four observations and is correspondingly reliable.

Prof. McClure's Barometer.

Prof. McClure's barometer had a notable history in mountaineering. To quote the professor's own words: "It has twice looked upon the beauties of the Columbia river from the summit of Mount Hood. It was the first barometer taken to the top of Mount Hood, and gave the true elevation, 11,225 feet, in place of 17,000 or 18,000 feet previously claimed. This barometric measurement of Mt. Hood was made in August, 1897, by a government party under the direction of Lieut. R. S. Williamson. The second barometric measurement of Mt. Hood was made with the same instrument in August, 1870, by Prof. George H. Collier."

In August, 1891, the barometer was carried by Prof. McClure to the summit of Diamond Peak; in August, 1894, by the writer, to the summit of the middle peak of the Three Sisters, in Oregon, giving an altitude of 10,980 feet, not hitherto published; in July, 1895, Prof. McClure took it with the Mazamas to Mount Adams, and in July, 1897, to the summit of Mount Rainier.

A new tube was fitted and inserted about two years ago, Prof. McClure preparing the mercury by distillation and the writer boiling it in the tube. The vacuum was exceptionally perfect. The comparison sheet previously mentioned showed that the instrument, on the occasion of its last trip read .005 inches above standard.

Conclusion.

In thus completing the labors of Prof. McClure, with whom I was so long and so intimately associated, I feel a very melancholy satisfaction. For his Barometer, I have spared no pains in collecting all the useful data that could be obtained, to make the result reliable to the last degree possible in such a case. I leave that result as a sufficient guarantee of the accuracy of the whole work from beginning to end.

Lincoln Park, Chicago.

One of the beauty spots of Chicago; is described in a most beautifully illustrated book, of 96 pages, now being distributed by the Chicago, Milwaukee & St. Paul Railway company. It is full of the finest half-tone pictures of one of Creation's most charming places of resort for citizens of the Great Republic. Everyone who has ever visited the park will appreciate the souvenir, and for those who have not it will be a revelation of what is to be seen in Chicago. It can only be procured by enclosing twenty-five (25) cents in coin or postage stamps, to Geo H Heafford, general passenger agent, 410 Old Colony Building, Chicago, Ill.

THE INITIAL LECTURE.—Today's Salem Statesman: A couple of hundred ladies and gentlemen were thoroughly well entertained last night by Prof Frederick S Dunn, at the chapel of Willamette University when he opened the winter lecture-course of the Classical Club, by some excellent reading from the Greek comedy, "The Frogs of Aristophanes." The translations by this accomplished scholar preserved to his auditors, intact, the inherent humor of the classic and as an entertainment it set a splendid pace for the good things to follow. It was a distinct success and the club has cause for congratulation in this its initial offering to the public.

WON'T GO BACK.—Jacksonville Times: "Jens Nelson, who left Jacksonville two years ago for Cook's Inlet, Alaska, returned recently. He was one of the two thousand people who went into that section in 1895, and he does not speak in flattering terms of it; in fact, he does not intend to go back to the frozen north at all. Mr N says that very few of the many who have gone to Alaska have been repaid for the trouble, and that there is much exaggeration in the reports that come from there."



The Late Edgar McClure.

Like his own high-strung frame, the delicate instrument was shattered; but neither of the twin went away from the world without leaving an imperishable record.

It is interesting to note the close correspondence of his independent observations with those made by others. The height of the mountain had been measured many times before he essayed to measure it. Some observers had measured it by triangulation, and others, notably Major E S Ingraham, of Seattle, had given its altitude from the readings of mercurial barometers. Major Ingraham gave the height at 14,524 feet. It will be noticed that the result obtained by Professor McClure was just four feet greater, a remarkable coincidence at that vast altitude and among conditions of hardships, ex-

offered up his life virtually a sacrifice to the cause of popular and practical science, and in as lofty a sense as ever dignified a Roman arena he was a martyr to the cause of truth. To use the matchless figure employed by Byron in describing the death of Henry Kirk White, who died a victim to his own passionate devotion to literary art, he was like the struck eagle whose own feather "winged the shaft that quivered in his heart."

Just in harmony with this thought came countless expressions of sympathy and condolence to the members of Professor McClure's family when the sad news of his death went abroad. One of the most touching, and to my mind, one of the most typical of all these came from an obscure man in an obscure corner of Kentucky. He was



Mount Rainier as Viewed From Lake Washington.

be reared to mark the spot where the young scientist gave up his life, no fitter design could be adopted than a stone shaft bearing on its face a bas-relief of the historic instrument which he bore on his back with sacred care. It is entirely probable that this barometer, coupled with his unselfish solicitude for the safety of other mem-

bers of the expedition, was the immediate cause of his death. He carried it in a double case, a wooden one which his own hands had constructed, and outside of this a strong leather tube. From this latter stout thongs enabled him to strap the instrument on his back, much as a pioneer huntsman would wear his trusty rifle. While standing on the perilous ledge whence he took the fatal plunge, he turned to sound warning to his companions whom he was leading in a search for the lost pathway down the mountain. "Don't come down here; it is too steep," he called, turning so as to make his voice more audible. These were his last words. He vanished in the night and the abyss. It is likely that the tube, three and a half feet in length, caught as he turned and helped to hurl him from his precarious footing.

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Cattle Shipments.

CN Thompson shipped from Eugene Saturday evening to Chicago 680 head of cattle. Wallace Chamberlain and Ed Stiles went along to care for the cattle. After a visit with his parents in Kansas, Mr Chamberlain will return, and Mr Stiles will also return in a few weeks.

Three cars of cattle were shipped last night from here to Gazelle, Cal, by town & Petron.

CORRECT.—A word to business men: A transient advertiser comes along and sweeps hundreds of dollars out of the town for "calendar" or "business man's guide." What does he leave for it? Something that is soon rubbish. Why not pay that money to a newspaper that gives employment to twenty families and spends every dollar it makes right in the city?

DIED.—At Creswell, Oct. 8, 1897, of typhoid fever, Rosa, the 7-year-old daughter of J M and Mary Martin. The funeral will be held at 1 o'clock Wednesday afternoon, Oct 10, the interment taking place at the Howe cemetery.

DIED.—At Florence, Oregon, Nov 2 1897, Daniel Hill, aged 19 years, oldest son of J B Hill. The funeral took place Wednesday at the Odd Fellow's cemetery in Glenada. Daniel was a bright noble boy and had many friends who mourn his untimely death. Mrs Hill is a sister of Mrs L B Rowland of Eugene.

BORN.—In Eugene, Oregon, Nov 7, 1897, to the wife of Quinn Sullivan, a 10 pound son.

The Dalles T-M: The horse cannery at Linnton is furnishing a market for a considerable number of cayuses from Eastern Oregon and Washington, and will in time relieve the ranges of a large number of useless stock. Today a consignment of 18 carloads were shipped away from the Dalles to Linnton. They were a lot of white-eyed, worthless ponies from the Warm Spring reservation, which the Indians had no use for hence they turned them off for "beef."

McMinnville Telephone - Register Nov 4: The barn and contents including five horses and one cow, belonging to Chas Oatman, three miles south of this city, was destroyed by fire early Sunday morning. The fire was discovered at 2 o'clock but it was too far gone to save the stock or any of the contents. The fire is considered incendiary. It is a bad loss. Mr Oatman was severely burned during his efforts to release the stock.

The Georgia legislature has passed a law making football an unlawful game.

Salem Journal: Miss Gertrude Hirsch entertained a party of young people at "hearts" Thursday evening in honor of Miss Rosalie Friendly, of Eugene.

The year 1854 was an eventful one for Oregon. In it there were born in Oregon Col Robert A Miller, US Senator Geo W McBride, Judge R S Bean, Judge Taylor, and ex-State Philiter Frank C Baker.