

ent points, a series of lines will be found, all of which theoretically pass through the centre of gravity of the figure.

Both of these methods have been tried on the map of the United States, and with the following result:—

A base map of the United States (scale about 112 miles to the inch) was cut out along the boundary, and the map so cut out suspended by a pin stuck through it. From the same pin a plumb-line was suspended. The map was swung upon the pin, and allowed to come to rest several times, and its mean position inferred. A line was then drawn on the map, representing the projection of the plumb-line upon the map in its mean position.

This process was repeated in several positions of the map, and a series of intersections determined,

Northernmost latitude (Minnesota).....	49° 24'
Southernmost " (Florida).....	24° 23'
Mean latitude.....	36° 54'

Northernmost latitude (Alaska).....	71° 22'
Southernmost " (Florida).....	24° 23'
Mean latitude.....	47° 53'

each intersection representing the centre of gravity, resulting from a pair of observations.

The centre sought was then assumed from an inspection of these points. From this adopted centre a circle with a radius of about one-sixteenth of an inch (some seven or eight miles in nature) would include all points except two resulting from very acute intersection, and which were rejected.

Again, a similar map was mounted on stiff cardboard, and then cut out along the boundary, as before. This was then balanced on the point of a spindle. It was balanced with the face of the map down, and then with the face up; and both balancings agreed in locating a point not differing visibly from the point determined by the preceding method.

This point, which according to one definition is the centre of the United States (Alaska excluded), is situated in latitude 39°.8 north, and longitude 98°.8 west of Greenwich. Plating this position on the land-office map, the point is found to be in *Cora township, Smith county, Kan.*, some ten miles south of the southern boundary of Nebraska, and a little to the westward of the middle of the state of Kansas.

These methods are directly applicable only to cases where the desired point is included in the given area. Such is the case with the United States, excluding Alaska.

If, now, we are to determine the centre, *including Alaska*, it will be necessary to determine the geographical centre of Alaska, and then determine, on the line joining these two centres regarded as a lever arm, the fulcrum between weights proportional to the areas of the United States alone, and of Alaska alone.

The centre of Alaska was found by the suspension method only. The intersections were all closely accordant, and locate the centre on the head waters of the Kuskokwim River in latitude 63°.4 north, and longitude 151°.5 west. The map used for the purpose was the base map of Alaska and adjacent regions, prepared some years ago by the coast survey.

These two centres found, as above described, were noted on a base map of North America, and

joined by the projection of an arc of a great circle. This line was then divided into parts inversely proportional to the respective areas of the United States alone, and of Alaska alone; and the point so found is adopted as the centre sought. For this purpose the area of the United States was taken as 3,026,000, and of Alaska, 583,000 square miles. The centre is found to be in latitude 45°.0 north, and longitude 103°.5 west from Greenwich; which locates it near Slave Butte, Dakota, some twenty-five miles east from the boundary monument between Dakota, Montana, and Wyoming.

If we assume that the geographical centre is determined by the intersection of a parallel and meridian, which are the means of the extreme latitudes and longitudes, then we shall have for the United States, *excluding Alaska*,—

Easternmost longitude (Maine).....	66° 57'
Westernmost " (Washington Territory).....	124° 47'
Mean longitude.....	95° 52'

and, *including Alaska*,—

Easternmost longitude (Maine).....	66° 57'
Westernmost " (Alaska).....	187° 32'
Mean longitude.....	127° 14'

In the first case (excluding Alaska) the centre lies in the Indian Territory, some seven miles from the southern boundary of Kansas, and about twenty-five miles a little west of south of Independence, Montgomery county, Kan.

In the second case (including Alaska) the centre is found to be in the Pacific Ocean, about one hundred and twenty-five miles a little south of west from Cape Flattery. This rather startling result brings into conspicuous notice the extension of the Alaskan possessions to the westward.

The only reference to the geographical centre of the United States that has met our notice is contained in the 'Fourth biennial report of the state board of agriculture to the legislature of the state of Kansas,' where it is stated, on p. 493, that "*Kansas is the central state of the Union, the exact geographical centre of the United States being at a point lying within a few miles of the centre of the state.*"

MARCUS BAKER.

Washington, D.C., April 15.

### Death of Dr. Albert Kellogg.

Among the recent deaths of scientific men, that of Dr. Albert Kellogg, the veteran botanist of the Pacific coast, is made known in the San Francisco papers.

He died in Alameda, Cal., on the 31st of March, at the age of seventy-four years. He was a native of New Hartford, Conn. For over thirty years Dr. Kellogg has been identified with the botany of California and the adjacent region, commencing Sept. 4, 1854, when he exhibited a drawing and specimen of a plant from the "salt marshes of the Bay of San Francisco, the *Frankenia grandifolia*," at a meeting of the California academy of sciences, of which he was one of the founders. During all these years he was constantly active, either in the field or the herbarium. He was exceedingly skilful with his pencil and brush in rendering from nature, and up to nearly the last moment was engaged in making drawings of the floral and sylvan species of the Pacific

states, particularly the sylva, with the intention of illustrating a work on the indigenous trees of California. He must have left a large and valuable series of figures, if not a completed monograph, of the botanical forms of the region referred to.

The published results of his various and prolonged investigations have appeared from time to time in the Proceedings and bulletins of the California academy and elsewhere; and his name holds a conspicuous place in all of the principal works relating to the botany of the western coast of North America.

In 1867 he visited the then Russian territory of Alaska in the capacity of surgeon and botanist to the special expedition of that year, having received the appointment from Prof. George Davidson, who had charge of the scientific division on that occasion.

Of his personal qualities, all who knew Dr. Kellogg will bear testimony to his simplicity, genuineness, and purity, and his invariable kindly disposition. His was altogether a rare and most lovable character. It may properly be said that his nature was in many ways as attractive as the beautiful forms he studied. Considering the period of his arrival in California, and the ruling passion and influences which governed the community at that time, as compared with his refined tastes and quiet ways of life, a most extraordinary contrast is presented. In the light of ordinary experience, it is hardly conceivable of a human being, among human beings of the same race, more absolutely out of place than he. However incongruous the surging tide and rush of affairs about him, he held the noiseless tenor of his way. His gentle life has passed. He will be affectionately remembered by many. R. E. J. S.

U. S. nat. mus., April 16.

### The barometer during thunder-storms.

A sudden increased height of the barometric column lasting a short time, which almost invariably occurs with thunder-storms, has recently attracted considerable attention. German writers claim that notices of the phenomenon can be traced back to various observers in that country for more than one hundred years. Dr. Hellman finds a notice of it in the work of Herr J. J. Planer in the last century, and Dr. Ferrari finds a notice of it in the writings of Toaldo of Italy in 1794.

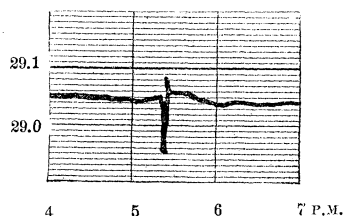
Mr. M. J. Johnson spoke of it in a paper read before the British association for the advancement of science in 1855. Since the somewhat general introduction of barographs, it has been so frequently and so widely noted, that I think it is now accepted as a characteristic phenomenon of thunder-storms.

Dr. Cirro Ferrari, however, claims that the little ridge of increased pressure attending the thunder-storm is only a part of the phenomenon. In front of this ridge he claims that there is a small trough or area of diminished pressure, and the most violent part of the thunder-storm falls between the two.

There are, however, a number of well-authenticated cases in which the barometer showed no indications of a diminished pressure preceding the passage of the storm, but showed an increased pressure during its passage. One of the most marked cases is given in the *American meteorological journal* (vol. i. p. 156), where it is shown that during the passage of a thunder-storm the barograph at Ann Arbor, Mich., rose .13 of an inch; but for ten hours preceding,

and for twelve hours following, the storm, the recorded pressure did not vary perceptibly from 28.94 inches.

No marked thunder-storm has passed over Blue Hill since the starting of the barograph at the observatory, without giving indications of an increased pressure during the storm; but only a few have given indications of a diminished pressure preceding the storm, except the slow, steady fall of pressure in a general storm, or broad secondary, within which the thunder-storm occurred. There have, however, been a few marked cases of a decided diminution of pressure attending certain storms. So far as the records show, all of these storms were attended by very high winds. In a few of the cases the sharp depression of the barometer lasted fifteen or twenty minutes, and was followed by a rise lasting slightly longer. One of the most marked cases occurred on July 21, 1886, and the depression lasted only a few minutes. A copy of the barograph trace during this storm is given in the following diagram.



This thunder-storm, which was characterized by very vivid lightning, lasted from about 5 to 5.45 P.M. It was attended by a most violent squall, lasting from 5.12 to 5.17 P.M., during which a large dog-kennel was taken up and smashed to pieces, rain-gauges were overturned, and other damage done. During this squall the barograph pencil fell about .10 of an inch, giving the trace as seen on the diagram. Overlooking this sudden fall, it is seen that there was a gentle upward swell of the barograph curve, lasting thirty or forty minutes, during the passage of the thunder-storm.

I am led to infer that the sudden fall of pressure was due to the dynamic effect of the wind in sucking the air out of the building, while the rise in pressure was due to other causes. It has been found that a greatly increased wind-velocity usually precedes or accompanies the immediate beginning of a thunder-storm; and it is suggested that the diminished pressure which has been found by Dr. Ferrari in front of thunder-storms is due to the dynamic action of the wind on the barometer or its environment, something like the action of a Sprengel air-pump.

There yet remains, however, to be explained, the rise in pressure during thunder-storms. There are a number of reasons for believing this not due to a lower temperature or falling rain. Professor William Ferrel, in conversation, suggested that this also was a dynamic effect of the wind, and was due to a reactionary effect of the sudden expansion of the air ascending in thunder-storms, something like the recoil which takes place from the sudden expansion of ignited powder. There are undoubtedly very rapid moving currents of air in thunder-storms, and it may well be that their sudden expansion or collision produces the effect in question.