physicists with the causes of them, astronomers were interested in the effects of the existence of this isothermal layer, especially in the phenomena of atmospheric refraction. It had been usual to make certain assumptions about the upper air for the calculation of refraction, and these assumptions were now shown to be wrong. Were the refractions calculated on such assumptions wrong? The answer seemed to be that very rough assumptions were sufficient for astronomers; he had found, for instance, that the assumption of two homogeneous shells of air would give empirical results corresponding closely to the facts observed.

Further, no very great improvement was found by adding a third shell—the chief step came in taking two instead of one. Possibly this fact, that two shells were absolutely necessary, but a third was not so much needed, was in some way connected with the existence of two principal regions in the atmosphere.

Prof. J. J. Thomson asked if there was any indication of the thickness of the layer, and remarked that the ionisation in the atmosphere was a maximum at a layer considerably below this layer.

Doctor [Gilbert T.] Walker stated that the Indian peasants were so ignorant that he had not yet ventured on sending up *ballons sondes* there, the chances of recovering them being so remote.

DAMAGES BY FLOOD AT KANSAS CITY, MO.

Thru an oversight, the statistics regarding flood damage at Kansas City, Mo., were unduly abbreviated in the MONTHLY WEATHER REVIEW for July, 1908. The paragraph on p. 206 relating thereto should read as follows:

The damage at Kansas City was very small compared with that caused by the flood of 1903, in fact, the damage to property was very light considering the size of the flood. Twenty-three business institutions in the bottoms, some in Kansas City, Mo., and some in Kansas City, Kans., report a total damage to property of only $91,500. The same number report a total loss by enforced suspension of business of $168,000 and value of property saved by the flood warnings of the Weather Bureau of $1,324,000. These figures multiplied by 10 will, in each case, fairly represent results, making a grand total of damage to property of $915,000 and loss to business of $1,684,000. The value of the Weather Bureau warnings is conservatively estimated at $5,000,000. The railroad losses were only about $350,000.

With this alteration the total losses in the Missouri Valley from Plattsmouth, Nebr., to Boonville, Mo., amount to $10,919,000.—*C. A., jr.*

THE SCIENTIFIC ASPECT OF A BALLOON VOYAGE.

By H. H. CLAYTON. Dated Bluehill, Mass., September, 1908.
[Reprinted in part from the Boston Sunday Herald, August 9, 1908.]

The trip described below was made from North Adams, Mass, on July 29, in company with Mr. Charles J. Glidden, of Boston.

The morning of July 29 seemed very unfavorable for an ascent at North Adams, Mass., since the sky was covered with a very low sheet of cloud which seemed to threaten rain. By 10 o'clock this stratum of cloud had cleared away. The sun came out, brilliantly hot, causing a rapid rise in temperature. While we were discussing the arrangements for the voyage and the time of leaving, we noticed that clouds such as are usually associated with thunder-storms had already begun to form over the mountains, and it seemed wise to postpone the beginning of the voyage until the late afternoon, a time which Mr. Glidden had previously found to be especially favorable for balloon voyages.

By 1 o'clock the clouds had developed enormous proportions over the Hoosac Mountains, and showed the overspreading tops characteristic of local thunder-storms. Under these conditions it seemed unsafe for a balloon, and the voyage was postponed until the clouds had begun to show signs of disappearing. Finally, at 4:30 p. m., the ascent was begun.

The wind was at the time very light, but showed a prevailing direction from slightly south of west. As the balloon rose it moved with increasing speed directly eastward toward the Hoosac Mountains. After we had risen to a height of about 2,000 feet we were traveling eastward at a speed of about 6 miles an hour.

THE UPDRAFT.

The temperature at the ground when we left was 86° and already it had fallen about 10°. As we approached the mountain, the balloon steadily rose to a greater height, indicating a strong ascent of air over the peak, where clouds still were seen but of much less proportions than in the earlier afternoon.

As the balloon came near the summit of the mountain it was caught in the whirling vapor and carried upward to a height of about a mile, the ascent being aided, however, by the throwing out of ballast in hopes that we might rise above the top of the cloud. As we approached the cloud the shadow of the balloon was seen distinctly outlined on the ragged mass of vapor, surrounded by rings of colored light.

The updraft over the mountain is indicated in outline in figure 1. This shows the clouds formed in this ascending current, and the balloon at the point of entering the upper portion of the cloud. The observations in the balloon showed that the temperature at this point had fallen to 68°; the clouds were formed by the chilling of the air due to its own expansion and the condensation of the invisible moisture which it contained.

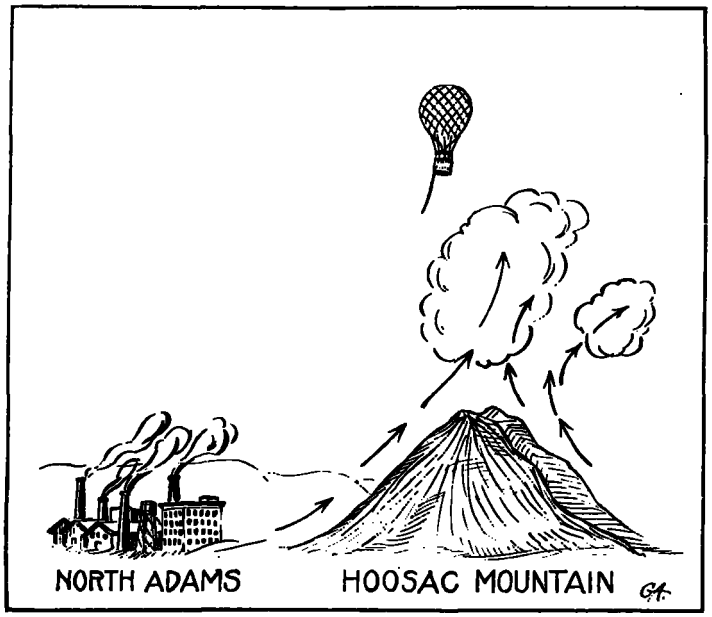

FIG. 1.—The updraft over Hoosac Mountain on July 29, 1908.

As the balloon passed the mountain summit and lost the ascending current which sustained it it began to descend rapidly, because in rising into the thinner air it had lost a part of its gas, which had flowed out at the bottom of the bag. Hence, the bag being unable to support its previous load, it was necessary to throw out sand very quickly to prevent falling entirely to the ground.

Notwithstanding, we fell so rapidly that the sand was past, the balloon dropping faster than the finest grains of sand. The rate of descent was about 6,000 feet a minute. This continued until the trail ropes touched the tops of the trees, after which the balloon, being relieved of part of its weight, floated smoothly along.

THE PATH OF THE BALLOON.

The path of the balloon from North Adams to its place of landing is shown by the broken line, figure 2. An analysis of this course shows that its bend was due to an indraft of air

toward the mountain, combined with the general wind then prevailing.

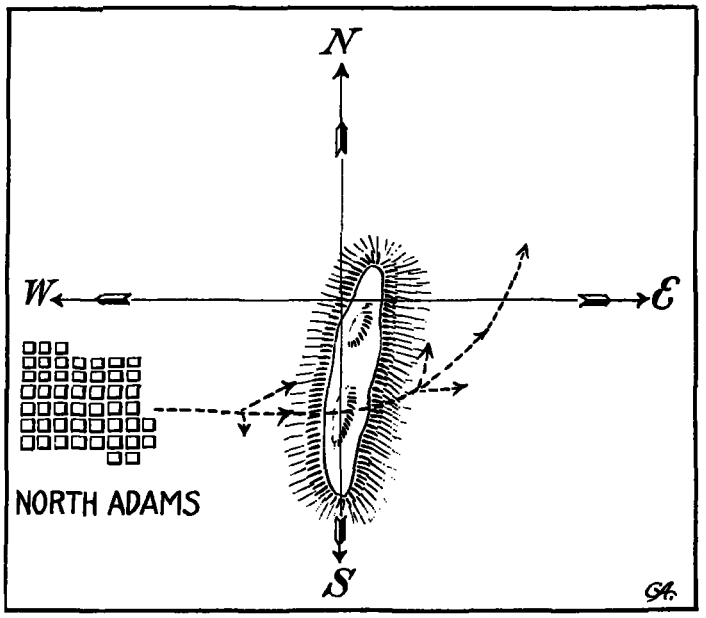

FIG. 2.—Diagram of the path of the balloon from North Adams, Mass., across Hoosac Mountain, July 29, 1908.

Between the Hoosac Mountains and North Adams, there is drawn a heavy arrow along the track, and on either side of the heavy arrow are drawn other arrows, the longer one showing the prevailing wind, the shorter showing the wind caused by the heated air flowing up the sides of the mountain. The flight of the balloon was the resultant of these two winds.

On the east side of the mountain a similar heavy arrow is drawn and the prevailing winds shown in the same way. So that the track of the balloon was directly toward the east on the west side of the mountain, but turned toward the northeast on the eastern side.

Noting the short arrows, which are intended to represent the local component of the wind under the influence of the mountain, it is seen that the wind tended to flow round and up the mountain slopes in the same way that air flows round and into a center of low pressure. And just as clouds and showers are found round the central area of a low pressure, so clouds were found round the summit of the mountain.

ASCENDING AND DESCENDING CURRENTS.

Messrs. Stevens, Hawley, and Van Sicle, who ascended at Dalton, Mass., earlier in the day, were drawn into one of these massive clouds found about the mountain, and there encountered a tremendous ascending current that carried them upward with frightful speed to 8,000 or 9,000 feet, after which, having lost much gas, they descended very rapidly.

Such experiences, however, are not rare. Several aeronauts, including Wise in America and Captain Goss in Germany, have related similar experiences in which the attendant phenomena were even more violent than those related by Mr. Stevens. In no case, however, has the aeronaut suffered any injury. Even if all the gas were driven out of his balloon, as was the case with Wise, the bag would act as a parachute and land the aeronaut without serious damage.

A mountainous region is not as favorable as level country for long voyages in balloons, because the ascending currents which prevail there cause the balloon to lose much gas. In taking a pleasure voyage over such a country, it is usually necessary to pass above the ridge of the mountain, and in doing so the balloon necessarily loses gas, even if the current ascending the side of the mountain is not strong. Immediately after the ridge is past, the balloon, no longer supported by the current, falls by its own weight and is further aided by descending currents which probably prevail on the leeward side of the mountain. This effect causes the aeronaut to lose his extra ballast rapidly and makes it difficult to float at a uniform height, which is the desideratum in ballooning. As opposed to the ascending currents of air, which are found over mountains, balloonists find that there are strong descending currents of air over cool portions of the earth's surface, like lakes and dense forests. A balloonist in Switzerland tells of being drawn down to the surface of a lake and held there by the descending current so that he was unable to rise again.

The following table, Table 1, presents the result of the records kept by Mr. Clayton on this ascent at North Adams:

TABLE 1.—*Meteorological observations by H. H. Clayton in balloon ascent with Charles J. Glidden on July 29, 1908.*

Time. 75th meridian.	Altitude of balloon above sea level.		Temperature.		Relative Humidity.	Wind.	
						Direction.	Velocity.
	Meters.	*Feet.*	°*C.*	°*F.*	*Per cent.*		*Mi. p. h.*
4:35 p. m.	240	787	29.1	84.4	58	w.	5
4:44 p. m.	500	1640	26.7	80.1	64	w.	6
5:00 p. m.	1000	3281	22.4	72.3	76	w.	7
5:13 p. m.	1500	4921	18.5	65.3	91	w.	7
5:15 p. m.	1560	5118	18.0	64.4	93	wsw.	7

Remarks.—The balloon left the ground at 4:35 p. m.; 5:09 p. m. among clouds; 5:12 p. m. a glory, two colored rings, was observed about the shadow of the balloon; 5:15 p. m. passing thru a cumulus cloud. Wind changed from W to WSW at 1,500 meters when crossing Hoosac Mountains and was from SW about 5 miles an hour on landing in W. Monroe, six miles ENE of North Adams. The sky was clear during the flight except for a few cumulus clouds over the mountain.

THE SECOND VOYAGE.

On September 10, 1908, Messrs. Clayton and Glidden made a more extended voyage, this time from Springfield, Mass. They remained in the air nearly five hours, from 0:38 to 5:23 a. m. and traveled from Springfield to Bridgewater, Mass. Table 2 gives some of the results of their observations during this trip.

TABLE 2.—*Observations during balloon voyage by Charles J. Glidden and H. H. Clayton, September 10, 1908, from Springfield, Mass., to Bridgewater, Mass.*

Place.	Time, 75th meridian.	Distance.	Velocity.	Traveling toward—	Height.	Temperature.
	a. m.	*Miles.*	*Mi. p. h.*		*Feet.*	°*F.*
Springfield	0:38	.....	.....	.....	125	59
Chicopee River	1:04	5	11.5	ne.	900	57
Central Massachusetts R. R.	1:48	9	12.3	ne.	1,000	50
Ware	2:30	7.5	10.7	ese.	1,500	60
North Brookfield	2:55	7.5	18.0	ese.	1,500	57
Worcester reservoir	3:18	8.5	22.2	e.	1,400	.....
Worcester	3:30	4.5	22.5	.....	.....	.....
Millbury	3:35	3	36.0	se.	3,000	60
North Pond	3:53	9	30.0	se.	3,000	.....
Milford	4:08	4	16.0	ese	1,500	.....
Neponset reservoir	4:45	14	22.7	.....	.....	.....
East Foxboro	4:51	2.5	25.0	e.	800	.....
Easton	5:04	5	23.3	e.	600	53
Bridgewater	5:23	7	22.1	e.	.....	.....
Total	.....	86.5				
Mean in four hours	.....	45	18.0	e.	.....	.....

Straight line distance = 82 miles.

THE METEOROLOGICAL WORK OF THE UNIVERSITY OF JURJEV (DORPAT), RUSSIA.

By ELMAR ROSENTHAL. Dated Tiflis, September 21, 1908.

The Meteorological Observatory connected with the University of Jurjev (Dorpat), has recently issued a volume of memoirs written by students of the university. The work was planned and supervised by Prof. B. I. Sresnevsky, Director of the observatory. The memoirs are written in Russian and followed by brief abstracts in German. The following gives a short account of these papers.