Mr. W. D. Maxwell, Observer, Rapid City, S. Dak., lectured on October 3 to the high school class in physical geography on atmospheric pressure, and its relation to the movements of storms across the continent. He also explained the construction and use of Weather Bureau instruments.

AWARD OF THE BUYS BALLOT MEDAL.

The proceedings for June 27, 1903, of the Koninklijke Akademie van Wetenschappen te Amsterdam contain an extract of the report made by the committee of advice for the according of the Buys Ballot medal. This committee consisted of Messrs. Julius, Haga, Zeeman, Van der Stok, and Wind, and their report gives so interesting a sketch of the work of the most active pioneers in the exploration of the upper atmosphere that it is briefly summarized herewith.

Recognizing the great importance to theoretical meteorology and to our knowledge of the general circulation of the atmosphere of the aeronautic investigations of recent years, the committee wished to award the medal to some one distinguished in this line of research. As it was impossible to select any one investigator as the only founder and original promoter of this work, the committee endeavored to choose, among the many who have carried it on, him whose efforts and achievements had made him the most conspicuous. This was by no means an easy task. Special commendation is accorded to Rotch, the founder and director of the Blue Hill Observatory, who first made use of kites on a large scale and for systematic observations, and who also set the example of flying kites from steamships, for the sake of the wind thus artificially produced or modified; to Teisserenc de Bort, who has used both kites and balloons on an exceptionally large scale both in France and in foreign countries; to Hildebrandsson, whose zealous, patient, and skillful work in the observation of clouds and in the development of simultaneous international cloud observations is worthy of admiration, and who has derived from the results obtained knowledge that may materially modify previous theories, since it tends to show "that in the northern temperate zone both the upper and the lower air on an average perform a whirling movement in the sense of the earth's rotation around the pole as a center, but with a centripetal component in the lower, a centrifugal component in the higher layers, a movement therefore quite different from the southwestern lower current and the northwestern higher current almost generally adopted hitherto"; and to Hergesell, who has not only himself investigated these problems, but, as chairman of the international aeronautic committee, has initiated the simultaneous international balloon ascents, carried out once each month since 1900 at ten different stations.

But the unanimous choice of the committee falls upon Richard Assman and Arthur Berson, editors of Die Wissenschaftlichen Luftfahrten des deutschen Vereins zur Förderung der Luftschiffahrt in Berlin, in which they have laid down the foundations, the course, and the results of their highly important series of observations. This publication describes the balloon expeditions, 75 in all, made from 1888 to 1889. The provisional results of a more general tenor obtained in these voyages are thus summarized by the committee:

1. Formerly it has sometimes been thought that the temperature in the higher layers of the atmosphere approached a limit of —35° to —50° C.; these investigations, however, do not at all point to the existence of such a limit. Temperatures also considerably lower than the above have come to light.

2. In the lower layers of the atmosphere the temperature, in rising, diminishes on the whole less rapidly than would answer to convective equilibrium. Above 4000 meters, however, the rate of decrease grows larger and seems to approach that value of nearly 1° C. per 100 meters as a limit. This is in keeping with a supposition of von Bezold based on theoretical grounds, whilst the behavior in lower layers can be accounted for by the influence of radiation, condensation, and evaporation.

The distribution of temperature found in this way is satisfactorily in agreement with the one found by Teisserenc de Bort, but disagrees considerably with that which was formerly determined by Glaisher.

3. The diurnal variation of temperature has, at a height of 2500 meters, shrunk down to less than one-tenth of its amplitude at the surface of the earth.

Of the annual variation of temperature the amplitude decreases rapidly at the lowest layer of 500 meters. Higher on it is rather a retardation of the maximum and minimum of temperature than a decrease of amplitude, which is still obvious. At a height of 4000 meters the highest and lowest temperatures seem to occur about the middle of September and March. The nonperiodical changes of temperature in the higher layers are hardly less intensive than at the surface of the earth.

4. Frequently low, but also sometimes higher in the atmosphere, there are layers in which the temperature increases instead of decreasing with the height. "Inversions" to an amount of even 16° C. have been observed.

Not seldom there are also layers in which the temperature in rising diminishes more rapidly than would answer to the convective equilibrium. It is very remarkable that these layers, which obviously tend to provoke a state of instability in the atmosphere, are often of a great thickness, reaching even 2500 meters for instance.

5. In accordance with results which Hann came to in the Alps, it has appeared that above middle Europe, both in winter and in summer, the temperatures at equal heights in anticyclones are in general higher than in cyclones, this, at least, holding good for heights up to eight kilometers. This result tends to corroborate the conviction of most meteorologists that the cyclones with their ascending and the anticyclones with their descending currents of air can not, as a rule, simply owe their existence to differences of temperature. By still more recent investigations it has appeared that the rate of decrease of temperature above the anticyclones, though at first smaller, is at greater heights greater than that above cyclones, so that it remains possible that in the very high layers of the atmosphere the temperature above the anticyclones is lower than above the cyclones.

6. In most of the cases several layers of a quite different nature and origin were clearly indicated in the atmosphere.

7. In rising, the moisture of the atmosphere generally decreases more than Hann had derived from observations of mountain stations and from those made by Glaisher.

8. Important data have been acquired about the formation and origin of clouds in connection with the distribution of the meteorological elements.

9. The velocity of wind increases with the height, strongly in the layers below 1000 and above 3000 meters, less so between these two heights. At a height of 5000 meters it was on an average four and five-tenths times as large as at the surface of the earth. Important data were also acquired about the difference in the direction of the wind between the lower and higher parts of the atmosphere.

10. Thermally and electrically the surface of a layer of clouds has a similar effect upon the region above it as the surface of the earth.

11. The rate of decrease of electrical potential seems to diminish when rising, and even to vanish entirely in the higher regions of the atmosphere. The result, arrived at from only a few observations, has afterwards been corroborated.

While, in the opinion of the committee, it is chiefly as editors of this important publication that Assman and Berson have won the distinction recognized in the award, they have rendered other services that the committee desires to emphasize: Berson by the intrepidity with which, in company with Süring, he has undertaken an expedition to altitudes whose extremely low temperature and greatly diminished pressure are dangerous to life—an expedition carried out for the sake of comparing the observations obtained from registering balloons with eye observations in a manned balloon started at the same time; Assman by the construction of the aspiration psychrometer and of the "Platz" balloons, made of caoutchouc, which attain to a height of 20 to 30 kilometers; and both Assman and Berson by their work since 1899 at the aeronautical observatory at Tegel, founded and directed by the former, where daily kite and balloon observations are made.—*F. O. S.*

LONG-RANGE FORECASTS.

By H. B. WREN, Observer.

[*Extract from the* Report for September, 1904, Maryland and Delaware Section of the Climate and Crop Service of the Weather Bureau.]

The ceaseless change in the midst of essential stability and permanence that is apparent among the heavenly bodies suggests a relation between those movements and the destinies of men and of nations. So obvious is this analogy that it is not strange that in the childhood of the race it was exalted into an absolute causal connection.

Astrology once permeated all religion, all science, and even politics; and the baneful influence of unfounded, unreasonable, or portentious predictions is not a modern affliction. Montaigne, the French philosopher and essayist of the sixteenth century, remarks that "a large sum of money was lost on 'Change at Rome by this prognostication of our ruin," referring to the prediction by Italian astrologers of the downfall of the French nation. Dean Swift, the powerful satirist, wrote "Predictions for the year 1708, by Isaac Bickerstaff, Esq.," to emphasize the absurdities and weaken the influence of long-range forecasters.

The infinite desirability of foreknowing the seasons for the benefit of husbandmen is at once the opportunity of charlatans and the justification of national weather services. It avails little to decry the methods of impostors or to brand them as fakirs; the court of final resort must always be a comparison of results, and such comparison every one can now make for himself. Weather maps showing the actual conditions on every day are now published by practically every civilized nation and are accessible to all; and all that is needed to cure the most implicit belief in almanac predictions is an honest comparison of these predictions for a single season with the actual occurrences as shown by these maps. Conspicuous instances of failure, such as those of the artificial rain makers, who, a decade ago, were given the fullest opportunity to test and exploit their theories, or the colorless results of the extensive campaign of bombardment as a protection against hail, conducted for several years in southern Europe, do not convince the credulous. They do serve, however, to illustrate the "confusion of tongues" among the prophets of these latter days, who bombard the skies to precipitate storms, and bombard the clouds to dissipate them. Government meteorologists are not alone in the denunciation of the fallacies, absurdities, and pernicious effects of so-called long-range forecasts. Professor Young, probably the foremost American astronomer, speaking of lunar influences, points out that the frequency of the moon's changes is so great that it is always easy to find instances by which to verify a belief that changes of the moon control conditions on the earth. A change of the moon necessarily occurs about once a week. All changes of the weather must therefore occur within three and three-fourths days of a change of the moon, and one-half of all changes ought to occur within forty-six hours of a change in the moon, even if there were no causal connection whatever. Now it requires only a very slight predisposition in favor of a belief in the effectiveness of the moon's changes to make one forget a few of the changes that occur too far from the proper time. Coincidence enough can easily be found to justify preexistent belief.

Those who are in a position to know are well aware that every possible effort is being made to extend our knowledge of the laws that control weather conditions, and meanwhile to give to those who are vitally concerned the most trustworthy information obtainable.

The problem of seasonal forecasts is receiving at the hands of the ablest and most painstaking students of both continents a comprehensive consideration that is certain to be fruitful and far-reaching in its ultimate results. So important and so pressing is this work and so promising is the field, that the Chief of the Weather Bureau is building and equipping a large observatory, wherein the best talent available will soon be employed to study the intricate and profound problems of the atmosphere, whose solution promises improvement over present methods and results in forecasting, and may lead in time to seasonal predictions on a truly scientific basis.

EFFECT OF RAINFALL ON THE PALM OIL TREE.

[*Extract from* British Colonial Reports—Annual, No. 427. Lagos. Report for 1903. Communicated by W. R. Buttenshaw, Imperial Department of Agriculture for the West Indies.]

The very remarkable shrinkage in the exports of 1903 as compared with those of 1902, as regards cacoa, palm kernels, and palm oil, is the result of highly unfavorable meteorological conditions, which well deserve special consideration. It is purely a question of rainfall.

As regards palm produce, the following pertinent paragraph may be quoted from the report of a commission to the governor of Lagos, in 1898:

The yield of fruit from the palm oil tree (*Elaeis guineensis*) varies according to rainfall. With a sufficiency of moisture the tree flowers every five or six weeks, and bears eight or nine mature bunches of fruit in the year, but if the rain supply is scanty the tree flowers only every ninth or tenth week, and the annual yield is reduced to about five bunches. In normal times the *Elaeis* bears eight heads (so-called nuts) in the year, but it follows a similar habit to the cocoanut, the heads being formed spirally and the axils of the leaves at regular intervals, which are long or short, according as the season is favorable. The mischief arising from insufficient rainfall does not finish with the number of heads, for the oil is extracted from the fibre of the thin outside layers of the fruit, which are either red, ripe, succulent and rich with oil, or starved, yellow, and destitute wholly or partially of oil, according to the amount of moisture afforded to the tree during the time the fruit has been maturing.

The following table has been prepared to show the yearly rainfall, in inches; the yearly export of palm oil, in gallons; and the export of palm kernels, in tons:

Year.	Rainfall.	Palm oil.	Palm kernels.
	Inches.	*Gallons.*	*Ton.*
1887	70.80	.....	.....
1888	49.87	2,446,705	42,525
1889	61.61	3,349,011	32,715
1890	90.88	3,200,824	38,829
1891	64.26	4,204,835	42,342
1892	69.68	2,458,260	32,180
1893	82.55	4,073,055	51,456
1894	70.10	3,393,533	53,534
1895	80.62	3,826,392	46,501
1896	74.23	3,154,333	47,649
1897	51.10	1,858,968	41,299
1898	80.20	1,889,939	42,775
1899	83.46	3,292,881	49,501
1900	72.82	2,977,926	48,514
1901	112.59	3,304,055	57,176
1902	47.82	5,240,137	75,416
1903	70.08	3,174,060	63,568

The correlation between rainfall and the quantity of palm produce exported from the colony is shown in an unmistakable manner by the above figures. They are given here in detail, because the falling off in the exports of 1903 was not understood by British merchants.

It will be noticed that the effect of an unusually great or abnormally small rainfall is sometimes felt most in the exports of the following year. This arises from the fact that the rainfall is divided into the former and the latter rains. Thus, in 1901 there was the unprecedented fall of latter rain of 31 inches in September and October, the effects of which are seen in the record export of 1902.

An examination of the above figures will show that the export of palm oil is even more sensative to rainfall than the export of palm kernels.

The greatest rainfall, that of 1901, preceded the almost phenomenally large export of vegetable produce in 1902. The short rainfall of 1902 enabled an intelligent observer to predict with certainty a great falling off in produce in 1903.

SEASONAL RAINFALL RÉGIMES IN THE UNITED STATES.

Prof. V. Raulin, of Montfaucon, France, advocates the classification and publication of precipitation statistics by meteorological seasons in place of, or in addition to, the calendar months and year. In a recent letter he incloses a map, fig. 1, showing the division of the United States into "régimes" based on the seasonal precipitation, as determined from the data of Weather Bureau Bulletin D. Professor Raulin states:

* * * the climatic chart is very interesting and shows clearly that precipitation is abundant in the neighborhood of the Atlantic Ocean, and decreases in the interior as far as to the neighborhood of the Pacific