portion is possibly in part due to the necessarily large dilution of the fruit with water, which considerably reduces the nitrogenous constituents of the "must," and also to the fact that the yeast, according to Hansen, mostly present on sweet fruits is the *Saccharomyces apiculatus*, which only possesses a feeble fermentative power. Experiments were made to see whether, by increasing the nitrogenous constituents of the "must," and introducing a pure cultivation of a vigorous wine yeast, the yield of alcohol would be greater. It was found that by adding a small amount of nitrogenous material, such as 0.15 grm. ammonium chloride, and 5 cubic centimeters of wine yeast per liter to the "apple must" (which was the fruit selected) 2 per cent. more alcohol was obtained, and not only was this the case, but this cider possessed a finer and more vinous taste than that untreated, or which had only received an additional supply of ammonium chloride without the wine yeast. Kosutany in a paper published in the *Landw. Versuchsstationen*, 1892, has recorded the results of his investigations on the behavior of certain species of wine yeast. He states that not only is the percentage of alcohol yielded very different with particular yeasts, but that also the taste, smell, and bouquet of the wine inoculated with special cultures were distinctly different according to the variety of yeast employed. It is hoped that, as in the case of tobacco so with wine, it may be possible to raise the quality by the judicious transplanting of bacteria obtained from finer brands.—*Nature*.

ORMONDE, THE "HORSE OF THE CENTURY."

ORMONDE—the "horse of the century" as his many admirers have styled him—left the port of Ensenada, La Plata, on December 21, by the steamship Clyde. Our sketch is from a photograph taken at the moment of embarkation, after Ormonde had walked down from

ORMONDE, THE HORSE OF THE CENTURY.

La Plata, a distance of four miles. The Clyde arrived at Southampton on January 12, when the famous horse was found to have stood the voyage remarkably well, and was in first class condition. A brief summary of his racing career will indicate the sources of his exceptional popularity, which must be great indeed when so huge a purchase price as £30,000 has been paid to Senor Bocau, of the Argentine Republic, by Mr. McDonogh, of San Francisco. Ormonde, whose sire is the famous Bend Or, won the Two Thousand Guineas, the Derby, and the St. Leger in one year (1886), a feat which only three horses had previously performed, namely, West Australian in 1853, Gladiateur in 1865, and Lord Lyon in 1866. He won as a two year old £3,008, including the Dewhurst Plate of £1,602; as a three year old, £21,552, including the three classic races above named; and, as a four year old, £3,905 10s., including the Hardwicke Stakes of £2,395 10s. Thus the total winnings in three years of this remarkable and never defeated quadruped amounted to £28,465 10s. In 1889 the Duke of Westminster sold him to Don Juan Bocau for £12,000, who in turn parted with him to Mr. McDonogh for \$150,000 last November.—*Daily Graphic*.

HISTORY'S MISLEADING CHRONOLOGY.

By SAMUEL W. BALCH.

THE superintendents of public instruction in the United States, through their executive committee on the Columbus day celebration, have established a new precedent by choosing for America's most impressive anniversary a date nine days later in the season than that on which it has hitherto been taught to belong.

Last February, the administrators of our public schools intrusted to a committee of representative educators from Massachusetts, Rhode Island, Tennessee, and Michigan the duty of preparing public school exercises befitting the anniversary of the discovery of a hemisphere. Foremost among the public acts of this committee was the advising Congress to pass a resolution appointing October 21 as the proper day on which to celebrate the discovery of America. This was done

in June last, and in the following month President Harrison issued a proclamation in accordance therewith. Thus October 12, which had become established in the literature of four centuries, and has been inculcated in the minds of generation upon generation, has been suddenly replaced, in the interest of scholarly accuracy, by a date hitherto untaught. Thus public attention is called to a want of accord between the majority of dates recorded in history and the precise seasons of the year which experience has taught us that these dates indicate.

The calendar which is now used by all civilized countries, except Russia and Greece, has an average length of year which corresponds with great precision with the round of the seasons. It does not, however, equal the period in which the earth makes the circuit of the sun and the same stars again return to the same watches of the night. Because of the inclination of the earth's axis and its slow gyration, there is a nodding to and from the sun, alternately, of the northern and southern hemispheres. The interval between successive nods is twenty minutes less than the time in which the earth goes around the sun. As the alternations of summer and winter and the periodic returns of seed time and harvest are due to this nodding movement, its period has been taken as the year, and our modern calendar has very properly been brought as closely as possible into agreement with it, instead of into agreement with the time in which the earth makes its revolution around the sun.

When the change was made from old to new style, two points of departure from the old calendar were ordered. First, ten days were struck out from October, 1752, when Pope Gregory XIII. ordered that the change should be made, and second, he ordered that three years in four centuries, which under the old rules would be leap years, should henceforth be common years. This second point of departure was all that was really necessary to keep the calendar to its place

his coronation and death is but twelve, yet he died in the fourteenth year of his reign.

From the illustrations that have been given, it will be clear that the dates with which many of the events of history were originally recorded do not convey to us a true idea of the time when those events transpired. To do this a uniform system of dating is needed, and two are candidates for the position; namely, the old and the new styles, with the years commencing at the first of January. The histories divide their patronage between them, designating both in the same manner and frequently affording no indication as to which one they are following. The new style already dates all that has transpired during the past century and a half, and is destined to be employed in the history of the future. To discard it is therefore impossible. With Washington's birthday, the landing of the Pilgrims, and the founding of Boston for the only notable exceptions, the old style marks all the history of England and her colonies prior to 1752, and all other history prior to the past three centuries. The old style as it is usually written in the histories, since it begins its years at January 1, is not the old style that was actually used, but a corruption of it. We have therefore a historical literature using a chronology that, in its dates prior to revision of the calendar, neither presents them uniformly as they were written at the time nor as they are now generally understood.

Dates in the old style calendar are usually accompanied by the letters A. D. or B. C. We now know that these abbreviations are not true statements concerning the years to which they are applied. It will therefore be proper to discard them and make their absence the distinguishing feature of the new chronology, while in books already written we may appropriately interpret the former abbreviations to mean, according to Dionysius, and the latter as, Bad Chronology.

Two systems of notation are followed in numbering the years before Christ. They differ from each other by a year, and may be designated as the historical and the astronomical systems of notation. The first, on the supposition that the year 1 was Christ's year, calls the year preceding, 1 B. C. This would be technically correct if the original supposition were true, yet, granting the supposition, it is objectionable for two reasons. First the leap years will fall in odd numbered years instead of in years divisible by four, as at present. Thus since the year 4 was a leap year, the leap year preceding would be assigned to 1 B. C., the next to 5 B. C., and so on. Second, the interval between dates will not be equal to the sum of the numbers of the years. Thus we cannot find the space of time between 2 B. C. and 1 A. D. by adding 2 and 1 together, as the result will be too great by one year. Likewise the interval from 2 B. C. to 2 A. D. is three, instead of four years. The astronomical system overcomes the above objections by introducing a year zero between the years 1 before and 1 after, as in longitude a zero meridian intervenes between the meridians one degree east and one degree west. In this system the proper method for distinguishing the years will be with the minus sign, since it will indicate that the years are available for calculation along with plus years according to the rules of algebra.

That all the dates of ancient events should be given according to our modern calendar is probably both impracticable and undesirable. Especial significance attaches to many dates because of their connection with time-honored holidays, and for this reason they should be preserved. It is, however, desirable that we should know the relation between the dates of each century of history which are recorded in the old style and our present calendar for anniversary purposes. To this end it seems that all works on history should make prominent mention, in connection with each period treated, of the relation between the calendar then used and the calendar of the present day.

The following table has been prepared to show what this relation is for each century since the commencement of the Christian era. It gives the first and last date of each period during which the difference is constant. Up to the twelfth century the Roman notation was generally used; and since this added the extra day in leap year by doubling the sixth before the calends of March, corresponding to February 24, the change is properly indicated on that day of the month instead of on February 29, up to that time.

TABLE FOR ASCERTAINING TRUE ANNIVERSARIES OF OLD STYLE DATES.

Julian Day.	Week Day.	New Style Date.	Year from Jan. 1, New Style	Difference	Old Style Date.	Year from Jan. 1, Old Style.
1,721,424	Sat.	Dec. 30	0*	-2	Jan. 1	A. D. 1
1,721,426	Mon.	Jan. 1	1	-2	" 3	1
1,757,637	Mon.	Feb. 22	100	-2	Feb. 24	100*
1,757,638	Tue.	" 23	100	-1	" 24	100*
1,794,162	Sun.	" 23	200	-1	" 24	200*
1,794,163	Mon.	" 24	200	0	" 24	200*
1,830,687	Sat.	" 24	300	0	" 24	300*
1,830,688	Sun.	" 25	300	1	" 24	300*
1,903,737	Thu.	" 25	500	1	" 24	500*
1,903,738	Fri.	" 26	500	2	" 24	500*
1,940,262	Wed.	" 26	600	2	" 24	600*
1,940,263	Thu.	" 27	600	3	" 24	600*
1,976,787	Tue.	" 27	700	3	" 24	700*
1,976,788	Wed.	" 28	700	4	" 24	700*
2,049,787	Sun.	" 28	900	4	" 24	900*
2,049,788	Mon.	Mar. 1	900	5	" 24	900*
2,086,362	Sat.	" 1	1,000	5	" 24	1,000*
2,086,363	Sun.	" 2	1,000	6	" 24	1,000*
2,122,887	Fri.	" 2	1,100	6	" 24	1,100*
2,122,888	Sat.	" 3	1,100	7	" 24	1,100*
2,195,941	Sun.	" 7	1,300	7	" 28	1,300*
2,195,942	Mon.	" 8	1,300	8	" 29	1,300*
2,232,466	Sat.	" 8	1,400	8	" 28	1,400*
2,232,467	Sun.	" 9	1,400	9	" 29	1,400*
2,268,991	Fri.	" 9	1,500	9	" 28	1,500*
2,268,992	Sat.	" 10	1,500	10	" 29	1,500*
2,342,041	Wed.	" 10	1,700	10	" 28	1,700*
2,342,042	Thu.	" 11	1,700	11	" 29	1,700*
2,378,566	Tue.	" 11	1,800	11	" 28	1,700*
2,378,567	Wed.	" 12	1,800	12	" 29	1,800*
2,415,091	Mon.	" 12	1,900	12	" 28	1,900*
2,415,092	Tue.	" 13	1,900	13	" 29	1,900*

Astronomers make their calculations in days, and for this purpose number them in a system based on the Julian year. These are given in the first column of the table. Leap years in either system are designated in the table by the sign (*).

The table is extended down to the next century, but, of course, the differences cease to apply to the chronology of each country now using our modern calendar since the date of its adoption. These are given in Bond's "Art of Verifying Dates," as follows:

Rome, Milan, greater part of Italy, Spain, and Portugal, October 15, 1582.

France, December 20, 1582.

German Roman Catholic states, Prussia, Roman Catholic Netherlands, Holland, and Zeeland, January 1, 1583.

German Protestant states and Protestant Netherlands, March 1, 1700.

Sweden, gradually, by omitting leap years from 1696 to 1744.

Great Britain and Ireland, September 14, 1752.—*Education.*

EXPANSION OF AIR BY HEAT.

THE expansibility or distension of solids, fluids, and gases by heat is a very extensive physical law, although generally unobserved, and is of the greatest importance in chemistry. Examples of the expansion of air by heat are very numerous. The following are some of the more simple processes of this kind, which I have found will illustrate this law as plainly as possible.

A small stoppered bottle of two or three cubic inches capacity is to be filled with pure air (at a low tem-

FIG. 1.—A glass bulb immersed in hot water with a piece of wet membrane over its mouth, blown out by the dilation of the contained air.

perature), which may be practically done by the application of the lips to the mouth of the bottle, so that one-half only of it is covered (the other part remaining open), and the air drawn out by suction; its volume is then replaced by external air drawn in through the remaining aperture to supply its place. This being done, the stopper can be wetted and loosely replaced. The bottle should now be tightly held in the warm hand, and the stopper will then be seen to pop up two or three times, emitting a jet of expanded air each time. If under the same circumstances the stopper, instead of being loosely replaced, is a little tightened, it will completely jump out by the application of the heat as above. Now if oxygen or hydrogen gas (both which are very combustible) is substituted for common air, the same experiment repeated, an ignited match held over the stopper, each jet of gas will produce a small blue flame.

A second simple method is to take a thin glass bottle, loosely tie a thin piece of caoutchouc or wetted membrane over the mouth, and then immerse it in water

FIG. 2.—A glass vessel after being immersed in boiling water. The air has been reduced to less than half its volume, as shown by the contained fluid.

at the temperature of ebullition (100° C.). The membrane will bulge out, and ultimately burst if it be very thin (Fig. 1). On the other hand, if the same bottle is immersed in cold instead of hot water, contraction of the inclosed air will consequently result, and the membrane will be drawn in more or less deeply concave. Not only does this law apply to gases (which are most sensible to it), but also in a less degree to fluids, and less still to solid bodies as above remarked.

Another good way of illustrating the same law, and perhaps the most obvious of all the preceding, is to obtain a thin glass vessel, with a double communication, that is to say with two mouths. By suction the air is drawn through this vessel by the widest opening, which is then well corked, and the whole immediately placed under boiling water. From the small unstoppered aperture numerous small bubbles of air will issue in rapid succession, due to the heat causing the contained air to dilate. When, after the bottle has been immersed a minute or two, the body is held out of water, considerable contraction of the expanded air will ensue, and consequently an equivalent quantity of water will

be drawn in; if after remaining thus a short time the vessel is taken out (still inverted) of the fluid, further condensation of the air will result, and small bubbles will continue to be drawn through the water, until the bottle and its contents have attained a temperature alike to that of the surrounding atmosphere (Fig. 2). The water drawn in and the remaining air will be nearly approximate to the air it first contained.

Upon this law is based the construction of the "air thermometer," and thermometers generally.—*Henry E. Griset in Hurdwicke's Science-Gossip.*

THERE seems to be no doubt that the natural gas in the Pittsburg field is becoming exhausted, and that its use in manufactories will have to be permanently discontinued. But it will leave behind it a desire for gaseous fuel that will have to be supplied artificially. Several large works outside of the natural gas regions have been compelled to make gas for use as fuel in order to compete with Pittsburg, and now their Pittsburg brethren may be compelled to follow their example.—*Philadelphia Ledger.*

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