

high school, which has section rooms sufficiently numerous to accommodate two dozen sections if required, instead of the nine sections actually existing. There is also a large hall, capable of seating 2,500 persons, in which Prof. Putnam lectured during his visit to the city.

Prof. Putnam made the suggestion to the local committee that the usual excursion shall this year take the form of a trip by lake after the close of the meeting, leaving Detroit on Saturday morning for Buffalo and Niagara Falls, and reaching Toronto on the day before the meeting of the British Association—an arrangement which will probably be made, though one member of the council suggested instead a trip to the Sault Ste. Marie with return to Toronto via Canadian Railway.

THE HEAVENS FOR MAY.

BY WILLIAM R. BROOKS, M.A., F.R.A.S.

THE SUN.

The sun's right ascension on May 1 is 2 h. 36 m. 27 s., and its declination north 15 deg. 18 m. 24 s.

On the last day of the month its right ascension is 4 h. 35 m. 19 s., and its declination north 22 deg. 1 m. 38 s.

MERCURY.

Mercury is evening star during the early part of the month. Having passed its greatest elongation east on April 28, it may be picked up during the first week of May in the western sky, just as soon as it is dusk. On May 21 it comes into inferior conjunction with the sun, or on a line between the earth and the sun, and changes from evening to morning star.

On May 10 Mercury is apparently stationary. On May 16, at ten o'clock, it is at the place of its ascending node, and on May 26 it is in aphelion.

On May 3, at 11 h. 26 m., Mercury is in conjunction with the moon, when Mercury will be 2 deg. 6 m. south of the moon.

It will be again in conjunction with the moon on May 30, at 7 h. 2 m., when Mercury will be 8 deg. 27 m. south of the moon.

VENUS.

Venus, after its long and splendid reign as evening star, came into inferior conjunction with the sun on April 28, and is now morning star. Very rapidly will it sweep outward from the sun's blinding rays, and after the middle of May will be a glorious object in the eastern morning sky.

On May 17 Venus is apparently stationary, that is, its orbital motion is in the line of sight, and at this time away from the earth. On May 21 it is at its descending node.

On May 1, at 6 h. 20 m., Venus is in conjunction with the moon. This is quite a close conjunction, Venus being only 22 minutes of arc south of the moon. Venus is again in conjunction with the moon on May 28, at 6 h. 6 m., when Venus will be 6 deg. 32 m. south of the moon.

On the first of the month, Venus, having just passed inferior conjunction, rises only a few minutes before the sun, and reaches the meridian at 11 h. 30 m. A. M. On the last of the month it rises at 2 h. 50 m.; and crosses the meridian at 9 h. 25 m. A. M.

The right ascension of Venus at the middle of the month is 1 h. 52 m. 47 s.; and its declination north 12 deg. 45 m. 40 s.

MARS.

Mars is evening star, well up in the western sky at dusk, but at such a great distance from the earth as to rob it of much of its interest as a telescopic object. It is well, however, to be able to identify it among the starry hosts. Mars is on the border line between Cancer and Gemini, and moving slowly into the first named constellation.

On May 25, at 7 A. M., there will be a very close conjunction of Mars and the star Eta in Cancer.

While the exact conjunction may not be seen, the two objects will be very near to each other on the evenings preceding and following the conjunction.

On May 21 Mars is in aphelion.

On May 7, at 4 h. 35 m. in the afternoon, Mars will be in conjunction with the moon, when Mars will be only 22 minutes of arc north of the moon—a distance ten minutes of arc less than the moon's diameter.

On the first of the month Mars crosses the meridian 4 h. 50 m. P. M., and sets about 20 minutes after midnight. On the last of the month it crosses the meridian at 4 h. P. M. and sets at a quarter past eleven.

The right ascension of Mars on the fifteenth of the month is 8 h. 3 m. 7 s.; and its declination north 22 deg. 6 m. 14 s.

JUPITER.

Jupiter is evening star, and in excellent position for observation in the early evening hours. Good telescopic work can be done on Jupiter in bright twilight, the belts often showing with wonderful distinctness at such a time.

Jupiter is apparently almost stationary two degrees east of Regulus, in the constellation Leo, during the first half of May.

On May 21 Jupiter is in quadrature with the sun, or ninety degrees east thereof.

On May 10 Jupiter is in conjunction with the moon,

at 2 h. 42 m. P. M., when Jupiter will be 3 deg. 20 m. north of the moon.

The following are some of the interesting phenomena of the satellites:

On the evening of May 4, at 10 h. 26 m., the I satellite will enter upon the disk of the planet in transit. At 11 h. 39 m. the shadow of satellite I will ingress. At 12 h. 45 m. the satellite I will pass off the disk. On May 9, at 8 h. 21 m. P. M., satellite II will disappear in occultation.

On the evening of May 12, at 7 h. 45 m., the shadow of satellite III will enter in transit. At 9 h. 27 m. the I satellite will disappear in occultation. At 11 h. 33 m. the shadow of satellite III will leave the disk.

On May 20, at 8 h. 41 m. P. M., satellite I will enter in transit. At 9 h. 58 m. the shadow of satellite I will enter in transit. At 11 h. 0 m. satellite I will pass off the disk, and at 12 h. 17 m. the shadow of satellite I will egress.

On the first of the month Jupiter is on the meridian at 7 h. 30 m. P. M., and sets at 2 h. 18 m. A. M.

On the last of the month it crosses the meridian at 5 h. 39 m. P. M., and sets about 20 minutes after midnight.

The right ascension of Jupiter on May 15 is 10 h. 13 m. 10 s. and its declination north 12 deg. 19 m. 6 s.

SATURN.

Saturn is morning star during the first half of the month, but comes into opposition with the sun on May 17, when it changes to evening star. It is in conjunction with the moon on May 16 at 1 h. 54 m., when Saturn will be 7 deg. 11 m. north of the moon.

Saturn rises on the 1st of the month at 8 h. 10 m. P. M. On the last of the month it is on the meridian at 11 P. M. and sets at 4 A. M.

URANUS AND NEPTUNE.

Uranus comes into opposition with the sun on May 17, at 1 o'clock, only 11 hours previous to Saturn. It rises then at sunset, and its place in the heavens for that date is right ascension, 15 h. 39 m. 7 s.; declination south, 19 deg. 16 m. 39 s. It is in the head of Scorpio.

Neptune is low down in the western evening sky, and too near the sun for observation.

Smith Observatory, Geneva, N. Y., April 19, 1897.

ON THE VARIATION OF LATITUDE.*

BY S. C. CHANDLER.

At the autumn meeting of the National Academy in 1894, which was the last occasion upon which I asked for its attention to this subject, I presented the numerical theory of the motion of the pole synthetically derived from the observations from the beginning of the history of the astronomy of precision up to that time, in its complete development, exactly as it stands to-day. Since then I have been interested to compare it with the various series of observations, as they have been published from time to time, not only for the purpose of verification or improvement of the numerical values of the various constants, but also to detect any additional characteristics which these later data might make apparent. These additional investigations have individually been neither extensive nor important enough to call for separate publication, since their general result has been nearly a satisfactory confirmation of the previous deductions as to the nature of the laws of these motions, without furnishing material improvement of the numerical elements. But sufficient material has thus been gradually accumulating to make the present communication of some interest.

The new material to be here utilized consists of the various series of observations by Tallcott's method up to the middle of 1896, as far as published, at the following European stations, named in order of longitude: Kasan, Vienna, Prague, Berlin, Potsdam, Karlsruhe and Strasburg. In America we have Doolittle's series at Bethlehem, which was brought to an end in the summer of 1895. He is now carrying forward a new series at Philadelphia, of which we may hope soon to see the results. Of the series at Columbia University, by Rees, Jacoby and Davis, begun in the spring of 1893 and still current, there have come into my hands within a few days the results for the first fourteen months, so that I have assumed the privilege of incorporating them in this investigation.

The curves of latitude variation from these various series are here shown (exhibiting several charts) and compared with the known numerical theory. This shows a concordance and fidelity of representation which is in every way satisfactory, the difference between computation and observation being practically within the range of the uncertainty of errors of observation.

A determination of the elements of the ellipse of the annual component of the polar motion was then presented, made from the new observations independently of the older ones previously used. The resulting elements are practically identical, as to form, size and position. This seems to show that the axis of this elongated vibratory motion is stationary on the earth's sur-

* Abstract of a paper read before the National Academy of Sciences, at Washington, April 21.

face along a meridian of forty-five degrees east of Greenwich. This negative evidence as to any apsidal motion seems to be of extreme importance in its bearing on the theory of the earth's rotation.

A demonstration was then presented of the fact that since 1890 the circular 428-day motion has been diminishing its radius, in conformity to the requirements of the numerical theory derived from the observations from 1825 to 1890.

In addition to the above, a discussion of 718 observations of the pole star, made with the Pulkowa vertical circle between 1882 and 1891, was given. This series is especially interesting and important, in that it covers an interval during which we have very little other information, of an extended character, as to the variations of latitude. A comparison of the curves of observation and theory, prepared for this decade, exhibited a most striking accordance, and apparently leaves no possible doubt that Nyren's inference (that his observations do not betray evidence of the existence of the annual component of the polar motion) is erroneous, and attributable to illogical methods in drawing his conclusions.

CLEANING HARDWOOD FLOORS.

People who are interested in cleaning off hardwood floors may be glad of some hints on the subject from the practical little journal called the Bautechnische Zeitschrift, which the American Architect translates as follows: Where oil colors or varnishes are to be removed from the surface of floors or furniture, it is usual to treat them with soda. As a rule, a solution of ordinary washing soda is employed, and applied cold. This in time accomplishes its task, but its action is slow, and not very efficient. A far better way is to use caustic soda, which can be bought in iron cans, and use the solution hot. With a hot lye of this sort oil color can be removed in a few minutes, and varnishes nearly as rapidly.

As the solution attacks the skin, it should be applied with a cotton or hemp swab. A bristle brush is useless for the purpose, as the bristles dissolve almost immediately in the lye, leaving nothing but the handle of the brush, while cotton or hemp are not affected. When the wood is clean, it should be well washed with water. The strong soda lye darkens the color of oak, but, if this is objectionable, it can easily be corrected by brushing the wood over with dilute muriatic acid, washing it thoroughly as soon as the color is satisfactory, and finishing with a weak solution of soda, to neutralize the last traces of acid. In applying the acid, neither cotton nor hemp can be used, as they are quickly destroyed, but bristle brushes are not affected unless they are bound with iron.

In general, care should be taken never to use muriatic acid in rooms or workshops where iron tools are lying about, as the vapor, even from dilute acid, is quickly diffused through the rooms, and attacks all iron or steel that it can reach. The best way is to make all acid applications in the open air. It is hardly necessary to say that cotton or linen clothes should be worn in using the soda lye, as a drop of lye, falling on woolen cloth, immediately makes a hole.

HORSELESS CARRIAGES AT THE BRUSSELS EXPOSITION.

It is especially desirable that all forms of automotors manufactured in the United States be exhibited at the International Exposition at Brussels next summer. Not only is the Belgian far behind us in this line of invention, but the "horseless carriage" has a great attraction for him, and even his Majesty King Leopold II has expressed a special interest in them, and, unless the American section contains such a display, it will be a great disappointment to many and a falling short of what is expected of American ingenuity. The streets and roads of Belgium are especially adapted to this method of locomotion, and an exhibit would not only attract a great deal of attention, but could hardly fail to be a success from a commercial point of view. Details in regard to the exposition and the steps to be taken in making an exhibit can be obtained by addressing the Commissioner General, Prof. J. H. Gore, the Columbian University, Washington, D. C.

BATS AND MUSIC.

On more than one occasion I have drawn attention in these pages to the influence of man's civilization on wild animals. For the past month I have noticed that a common species of the small bat, probably the pipistelle, which frequents the towns in southern France, congregates in the evenings about those cafés where it is the custom to have outdoor music. This does not seem to apply to any particular town, as they are to be seen flitting about in the crowded streets among all the traffic in Marseilles, Cannes, Nice, and Monte Carlo. So tame are some individuals that they hawk about for flies under the awning which covers the chairs placed on the footpaths. It may be said they come for the flies attracted by the electric lights, but the bats are far more numerous near those cafés where there is music than around the ordinary are lights in streets or before shops. The inference appears to be that they find pleasure in the presence of music.—John T. Carrington (Beaulieu, Alpes Maritimes), in Science Gossip.