be found incapable of producing the feeblest development. Perfectly limpid at first, the liquid remains indefinitely limpid.

We are led to believe that the cultivation of the attenuated virus in a chicken places its body in the same state as that of the liquid which can no longer sustain the life of the germ of disease. We may extend the comparison still further, for, if we filter the broth on the second day of the cultivation, instead of on the fourth, the filtered liquid will still permit the cultivation of the germ, but less readily than at first. This may enable us to understand that the cultivation of the attenuated germ in the body of a chicken may not have removed all the food for the germ. The remainder may allow a fresh cultivation of a feebler kind. This is the same as a first *vaccination*. Subsequent inoculations will remove progressively all the materials for the cultivation of the parasite. Through the action of the circulation, a time will come when any new cultivation on the animal will remain unproductive. Then the disease cannot recidivate, and the subject becomes perfectly vaccinated.

It may seem astonishing that the first cultivation could have stopped before all the food of the germ has been destroyed; but we must not forget that the germ is aerobian,† and that, in the body of an animal, it does not find the same conditions as in an artificial medium of cultivation, in which there are no obstacles to its propagation. In the body, on the contrary, it finds opposition from the cells of the organs, which are also aerobian, and are continually absorbing oxygen.

We might also account for the fact of non-recidivation by admitting that the life of the germ, instead of destroying certain substances in the body of an animal, on the contrary, adds other substances which act as an obstacle to its further development. The history of the life of these inferior beings, of all beings in fact, authorizes this supposition. The excretions due to vital functions often prevent vital functions of the same nature. In some fermentations, antiseptic products are formed while fermentation is going on, and even by the action of ferments, and these products put an end to further action, even if there are still substances left capable of undergoing fermentation. In the cultivation of our germ, there might, in the same way, be substances formed whose presence might explain non-recidivation and vaccination.

Our artificial cultivation of the parasite will enable us to examine this hypothesis. If we prepare an artificial cultivation of the germ of chicken cholera, we may evaporate the liquid *in vacuo* while cold, then bring it back to its original volume by the addition of chicken broth. If the extract contains a poison which destroys the germ, and if the presence of this poison is the cause of its non-development, the cultivation of the germ cannot take place in this liquid. On the contrary, the development does take place without difficulty. We cannot then believe that, during the life of the parasite, there are substances produced which prevent its further development. This is a corroboration of the opinion which we have expressed on the cause of non-recidivation in certain virulent diseases.

DENSITY OF LIQUID OXYGEN.—J. Offret has revised Pictet's calculation of the density of liquified oxygen and considers the method inadmissable. His own calculation gives 0.840.

EXPLOSIVE ANTIMONY.—A solution of crystalline antimony chloride and hydrochloric acid at 1.12 sp. gr. was prepared so as to stand at 38° B. On electrolysis with the Lechlanché element there was obtained in twenty to twenty-four hours a most explosive deposit.—E. MASCARENAS Y HERNANDEZ.

† Pasteur divides germs and other microscopic organisms into *aerobians* (requiring air to live) and *anaerobiæ* (which do not require air).—*Translator.*

ASTRONOMY.

THE Roman Academy of Sciences has awarded half of the King Hubert Prize to Dr. Wilhelm Temple, Director of the Acetri Observatory at Florence, for his observations on Nebulæ.

THE second Part of Vol. II. of papers relating to the Transit of Venus has recently been published by the Paris Academy of Sciences. It contains, among other things, the last of the Memoirs relating to the expedition to the island of St. Paul, the Meteorology by Dr. Rochefort, and the Geological Researches made at Aden, Reunion, St. Paul, Amsterdam and Seychelles, by M. Vélain. The first Part of Vol. III., which is to contain a report of the work done at Campbell Island, is in preparation.

THE "Reports of the Total Solar Eclipses of July 29, 1878, and January 11, 1880," forming Appendix III, to the "Washington Observations for 1876," has just been distributed from the Naval Observatory.

OWING to an error in the telegraphic dispatch, the discoverer of Comet *f*, 1880, was called *Pennule*. It should have been *Dr. C. F. Pechüle*, of Copenhagen. The comet seems to have two tails, one pointed towards the sun, and the other pointed about N. 15° *f*.

ASTRONOMICAL MEMORANDA: — (Approximately computed for Washington, D. C., Monday, February 7, 1881.)

Sidereal time of Mean Noon, $21^h\ 11^m\ 49^s$.
Equation of time, $14^m\ 25^s$.
Mean noon *preceding* apparent noon.

The *Moon* crosses the meridian at about 8.30 P. M. Full moon occurs on the 13th, and the last quarter on the 21st of the month:—New moon on the 29th.

Mercury is still evening star, following the sun by nearly an hour. He reaches his closest position to the sun on the 21st, and "greatest elongation" on the 22nd.

Venus is still the most conspicuous object in the evening sky. She increases her apparent distance from the sun until Feb. $20^d\ 7^h$, when she reaches "greatest elongation" East, an angular distance of 46° 34'.

Mars crosses the meridian at about 10 o'clock in the morning. He is nearly 23° south of the equator.

Jupiter and Saturn form with Venus an unusually good opportunity for the amateur astronomer to make use of his telescope in the early part of the evening. Jupiter and Venus will be in conjunction on the 21st.

Uranus is on the meridian about two hours after mid-night, and *Neptune* about half-past five in the afternoon. Uranus is in conjunction with the moon on Feb. 15th.

The *Comptes Rendus* for Jan. 3, 1881, contains a paper by M. Rouget upon a method for use at sea, and for travelers, explorers and others, for determining latitude and sidereal time, dispensing with the measurement of angles.

Two stars are observed having at a given moment, the same altitude: such observations are combined in pairs, and by merely noting the time which has elapsed between the two observations, a simple interpolation in tables prepared for the purpose will give the sidereal time and the latitude of the place of observation. Formulæ are given for the case mentioned above, and also for deducing the latitude and sidereal time from stars having the same azimuths, or azimuths differing by 180°. A succeeding paper by the same author extends the formulæ to the determination of longitudes, by employing observations of the moon.

W. C. W.