OUR ASTRONOMICAL COLUMN.

DANIEL'S COMET, 1907*d*.—Signor Pio Emanuelli, of Rome, has favoured us with a manuscript copy of a daily ephemeris for Daniel's comet, calculated by him from the elements computed by Prof. E. Millosevich. An abstract from this ephemeris is given below:—

Ephemeris 12h. (M.T. Paris).

1908	α (1908·0) h. m.	δ (1908·0) ° ′	r	Δ
May 8	14 7·6	−0 51·1	0·590	0·467
16	14 1·4	−0 31·0	0·600	0·487
24	13 56·2	−0 18·8	0·610	0·508
31	13 52·6	−0 14·5		

From this it will be seen that the comet is now apparently travelling very slowly through the constellation Virgo in an easterly direction; its present magnitude is about 11·0, and it crosses the meridian about 11 p.m.

THE SOLAR ROTATION DETERMINED FROM HYDROGEN PHENOMENA.—From a discussion of the results obtained in a spectrographic determination of the solar rotation, using the hydrogen lines Hα, Hγ, and Hδ, Prof. W. S. Adams arrives at conclusions fundamentally important in any study of the solar structure; the full discussion, together with a description of the instrument and methods employed, appears in No. 3, vol. xxvii., of the *Astrophysical Journal* (April, pp. 213 *et seq.*).

The first conclusion is that the sun's rotational velocity as shown by the hydrogen lines is higher than that given by those of other elements and by the study of sun-spots and faculæ; the excess amounts to 1° in the angular motion at the equator. It is worthy of remark that Hα, which shows abnormal tendencies in its width, its intensity, and its behaviour at the sun's limb, gives slightly higher velocities than the other hydrogen lines. The second conclusion is that in the regions where the hydrogen lines are produced the equatorial acceleration of the solar atmosphere is non-existent, or too small to be measured by the present method. These conclusions point to the absorbing hydrogen being situated at a higher level than other absorbing media, *e.g.* calcium; a previous investigation (see NATURE, No. 1990, p. 158, December 19, 1907) showed that carbon and lanthanum gave lower velocities than general, and are, therefore, probably situated at a lower level.

The results of a study of the solar rotation, based on the measurements of hydrogen flocculi, are published by Prof. Hale in the same journal, and they confirm the absence of the equatorial acceleration in the absorbing hydrogen atmosphere of the sun.

THE CANALS AND OASES OF MARS.—In the *Century Magazine* for May (vol. lxxvi., No. 1, p. 127), Prof. Lowell continues his explanation and discussion of Martian features, taking the canals and oases as the special subjects of this article.

Recounting the history of the canaliform marking since their discovery by Schiaparelli in 1877, Prof. Lowell strongly emphasises the numerous points which go to prove their actual reality. The narrowest canal appears as it would were it but three miles across, but the average width is some twenty miles. They vary in length from 250 to 2500 miles, and one, the Eumenides Orcus, extends for some 3450 miles. Schiaparelli mapped 113, but 436 canals are now known to the Flagstaff observers. Of the oases, first seen by Prof. W. H. Pickering in 1892, there are now 186 marked on the Flagstaff map of Mars. The special features of all these markings, their seasonal variations, their similarities and concordant behaviour, and the weight of evidence added by the geminated canals, are all discussed by Prof. Lowell, and the results are shown to be consistent with the theory that the features are there for a set purpose, their functions having been determined by sentient beings for the sustenance of life and vegetation on a planet which has reached a stage further in the evolutionary process than has the earth.

THE COLOUR SENSIBILITY OF SELENIUM CELLS.—In a recent determination of the moon's light, Messrs. Joel Stebbins and J. C. Brown, of the Illinois University Observatory, found that the results depended upon the cell used, and suggested that the variation was due to differences between the colour-sensibility curves of the several cells (see NATURE, January 16 and 30, pp. 258 and 302). In a recent investigation Mr. Stebbins found that this explanation is correct, and in No. 3, vol. xxvii., of the *Astrophysical Journal* (April, p. 183) he gives the numerical results and a series of colour curves illustrating the variations of the four cells employed.

THE ASTRONOMICAL SOCIETY OF ANTWERP.—The third annual report (1907) shows that this society is progressive, and is fulfilling its primary purpose, the popularisation of astronomical science, exceedingly well. The instrumental equipment has been largely added to, the various meetings for practical work and for lectures are well attended, and there are now about 140 names on the list of members. An important event in the history of the society during the past year was the foundation of the *Gazette astronomique*, a most useful monthly journal for amateur observers.

MICROGRAPHIC STUDY OF LEATHER.

UNDER the title "Étude micrographique du Cuir," M. Henri Boulanger has published in the *Bulletin de la Société d'Encouragement* for February of this year a series of interesting drawings showing the microscopic appearance of various sections of raw and tanned hide. The chief interest in these consists in the demonstration of the changes which take place in the skin during the process of tanning. About thirty years ago a very similar study was undertaken by the late Franz Kathreiner, of Worms, on the microscopic preparations of raw and tanned calf skin, in all the various stages of the tanning process, and the writer has had the privilege of seeing these very beautiful preparations; unfortunately, Kathreiner's results were never published.

The microscopic appearance of sections of raw skin is well known to those who have made a scientific study of tanning, but that of leather has not received so much attention owing to the difficulty of preparing sufficiently thin sections to be of use, and further of differentiating the constituent parts.

The author himself remarks that it is almost impossible to make a satisfactory section of the flesh side, and he has therefore confined his studies exclusively to the "grain" side of the skin. This is commonly called the epidermis, but it is difficult to apply strictly the vocabulary of the histologist; in this case the true epidermis disappears completely in the process of preparing the skins for tanning, and what the tanner calls the "grain" of the skins is the hyaline membrane covering the upper surface of the Rete Malpighi.

M. Boulanger's method of preparing the sections of raw skin has the advantage of being a rapid one; small pieces of skin are soaked for twelve hours in a solution composed of:—distilled water, 5 grams; glycerin, 5 grams; acetone, 90 grams. They are then allowed to dry, embedded in hard paraffin, and are ready for the microtome. The staining and mounting of the sections is carried out by the usual methods. The microscopic appearance of the sections was reproduced by coloured drawings made with the camera lucida, since a photograph will not show the various depths of the section. The illustrations shown are photographs of these drawings. Fig. 1 shows the appearance of a section of the grain side of a fresh cow-hide taken from the breast between the fore legs; in scientific language, the upper surface of the dermis—the fibro-elastic layer. It is stained with carmine alum, and shows clearly the flat, inert cells of the epidermis, which it is often difficult to preserve intact in microscopic sections, especially in a hide or skin which has been salted. Immediately below this are the living cells of the Malpighian layer; the nuclei of these cells are well shown in the figure. Just below this layer, which will eventually form the "grain" of the tanned leather, are seen the papillæ of the dermis; the dark spots are the nuclei of the cells of the connective tissue. A hair follicle is also shown, as well as a hair in vertical section. The magnification of the plate in the memoir is 285 diameters, and is one-half this amount in the accompanying reproductions of two figures. Compare the appearance of Fig. 1 with

that of Fig. 2, which shows a section of cow-hide tanned with oak-bark and curried with *dégras*.

Before describing Fig. 2, it is necessary to explain the mode of preparation of the section. A small strip of leather about 10 mm. wide is taken, and the flesh side shaved away until the piece has a thickness of about

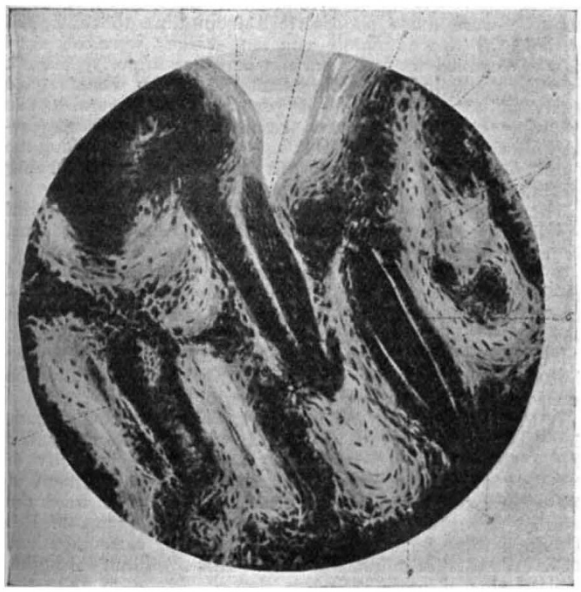

FIG. 1.

2 mm. The shaved strip is placed in melted tallow, not too hot, for about a quarter of an hour; after cooling, the strip is embedded in hard paraffin and cut in a Ranvier microtome, the sections degreased with xylol, then washed two or three times with alcohol, and stained with Weigert's fuchsin; the staining takes about three hours; the

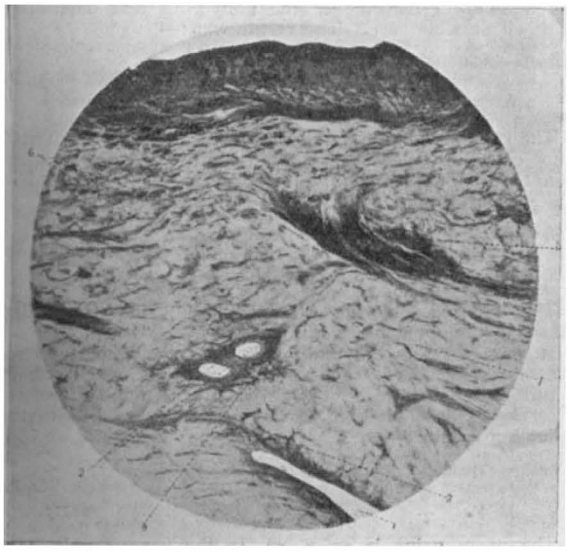

FIG. 2.

Weigert solution is poured off, and a few drops of absolute alcohol put on to the section; this removes excess of dye, and differentiates the various parts. It is now washed twice with alcohol, passed two or three times through xylol to eliminate the alcohol, and finally mounted in balsam.

In M. Boulanger's view, the skin, when freed from the hair and the histological epidermis (both of which are got rid of in the preparatory processes), is composed of two tissues, an upper and a lower, intimately united, although of distinctly different natures. No scientific designation has been given to these two distinct layers, but the whole has been called the dermis; in view of their special constitution, and to distinguish them, he calls the "grain" the fibro-elastic layer and the "flesh" the layer of giant connective fibres. The elastic fibres in their natural state take up Weigert's stain readily, and they retain this property after tanning; both before and after the tannage they form the essential framework of the skin or leather; without them there is no elasticity or suppleness, and tanning does not appear to alter their constitution. The connective fibres, on the contrary, are completely changed, so that we may conclude that the tannin acts differently on the two tissues.

The present writer will not here discuss this conclusion, though in his opinion there is no such distinct difference between the two portions of the skin, but that in the "grain" the connective tissue is fine and closely compacted, whereas in the "flesh" it becomes loose and coarse; thus the difference is in degree, and not in constitution. Boulanger's fibro-elastic layer must not be confounded with the elastic yellow fibres which form a comparatively small part of the volume of the skin. Comparing the two figures, there is a striking contrast in the general setting of the elastic fibres. In the raw skin they ramify in all directions, whereas in the tanned skin they only exist in a longitudinal direction, as a consequence of the dilation and preparation that the skin has undergone.

M. Boulanger has utilised his method in the study of leather for use as belts, &c., the results of which are published in his book, "Essais du Cuir dans ses Applications industrielles." There is no doubt that the method of microscopic examination of leather might be of considerable use after much practice in the manipulation and comparison of various leathers has been acquired. It would then be possible to determine whether the leather under examination had been made from a salted skin or a fresh skin, of European origin, or from a foreign dried skin, the sex of the animal, cow, ox, or bull; whether the leather had been adulterated, overloaded with tannin or weighting materials, &c., in short, the history of the pelt might be deduced from the study of the tanned leather. Let us hope that the younger generation of tanning students now being trained in the leather industries department at the University of Leeds and at Herold's Institute in Bermondsey will keep up the reputation of England in this work. J. T. W.

THE ATOMIC WEIGHT OF RADIUM.[1]

ALTHOUGH there has been a considerable amount of discussion, based upon spectroscopic considerations and on its supposed mode of genesis, respecting the place of radium in the system of the elements, and inferentially, therefore, concerning its atomic weight, we are indebted for the only direct experimental determinations of this value hitherto made known to the discoverer of the element, Mme. Curie. Her first observations, published in 1902, were made on about 90 milligrams of the chloride, and furnished the value 225.

In the autumn of last year Mme. Curie communicated to the French Academy the results of a second series of estimations made upon about 4 decigrams of the carefully purified chloride; these afforded the value 226·2 as the mean of three closely concordant determinations ($Ag=107·8$, $Cl=35·4$).

In 1906, at the instance of Sir William Huggins, then president of the Royal Society, and by the aid of the kind interest shown by H.R.H. the Prince of Wales, the Austrian Government placed about 500 kilograms of pitchblende residues from Joachimsthal at the disposal of the Royal Society. These residues were worked up by M.

[1] Bakerian Lecture for 1907. Delivered at the Royal Society by Dr. T. E. Thorpe, C.B., F.R.S.