

vol. i., including the measures of nebulae situated between 0h. and 2h. of right ascension. The first part of this volume will contain the introduction, and will include a full description of the instruments and methods employed in the research.

Vol. ii., including the section 2h.-9h., is to appear soon, and will be followed by vol. iii., giving the results for the region 9h.-14h. (*Comptes rendus*, No. 12).

A LARGE PHOTOGRAPHIC NEBULA IN SCORPIO.—On examining the photographs obtained during his sojourn at Mount Wilson last year, Prof. Barnard found that an immense region near to π and δ Scorpii is occupied by a large nebula which is comparable in size, and in the peculiarities of its several branches, with the great nebula in Orion and the extended nebulosity of the Pleiades.

A short description of this nebula, together with a splendid reproduction of a photograph of it, taken with the 10-inch Brashear lens of the Bruce doublet, is given in No. 2, vol. xxiii., of the *Astrophysical Journal*.

The nebula extends some $4\frac{1}{2}^\circ$ or 5° in a north and south direction, and its brightest portion lies about $\frac{1}{2}^\circ$ to the south of π Scorpii.

A striking fact in connection with this object is that all the larger stars connected with it are, as might be expected, of the Orion type.

Prof. Barnard thinks that the branching, straggling character of this and similar nebulae tends to discredit the accepted form of the nebular theory of stellar evolution, and doubts whether that theory would have ever been constructed if, at the time, our present knowledge of the appearance of nebulae, as shown by photography, had been available.

CANADIAN TIDES.

A PAPER on tide levels and datum planes on the Pacific Coast of Canada was read recently by Mr. W. Bell Dawson, the engineer in charge of the tidal survey, at the meeting of the Canadian Society of Civil Engineers. The survey of the Canadian waters on the Atlantic side has been in progress now for some years under Mr. Dawson's charge, and has so far advanced that permanent tide gauges have been fixed at several representative parts of the coast, and sufficient tidal observations obtained to enable the Marine Department to issue tide tables for most of the principal ports. The survey has now been extended to the Pacific Coast.

In the paper under notice the bench marks and data used by the Admiralty, the Hudson's Bay Company, and the town authorities on the coast have been connected up by levelling, and the bench marks at Victoria, Esquimaux, Vancouver, and other tidal stations referred to one common standard. These levels are given in the pamphlet. The importance of publishing such results is emphasised by the fact that the bench marks of former surveys are now to a great extent useless, because they were never made public, and the level books containing the records of these surveys have been destroyed by fire, and so a large amount of good work has been rendered useless, and subsequent trouble and expense caused.

The tides on the Pacific Coast are peculiar, the leading feature being a pronounced diurnal inequality which accords with the declination of the moon, and is subject to an annual variation with the change in the declination of the sun; also there is an unusually large solar effect relatively to the lunar, especially in the northern part. In some parts of the coast during the greater part of the day there is a long stand or only slight fluctuation near high-water level, with a sharp, short drop to the lower low water which occurs once in the day. Owing to this diurnal inequality the two highest and lowest points in the tide curve for the month may be as much as five days before or after the full and new moon. While the tides on the Atlantic side of Canada follow the phases of the moon, and accordingly the alternations of spring and neap tides are the dominant features, the tides on the Pacific side may be described as declination tides.

The careful study of the tides and of the mean sea-level appears to indicate that this coast is rising at a rate as great as 1 or 2 feet in the century.

THE INTESTINAL TRACT OF MAMMALS.

IN a memoir "On the Intestinal Tract of Mammals" (Trans. Zool. Soc. of London, xvii., part v., December, 1905, pp. 437-536), Dr. Chalmers Mitchell extends to mammals the line of investigation which has already, in his hands, yielded results of great interest when applied to birds, namely, the systematic study of the pattern and arrangement taken by the folds and coils of the intestinal tract. With this object, the author describes the pattern of the intestinal coils in a great number of mammals dissected by him, representing examples of each of the principal subdivisions of the entire class. The descriptions are supplemented by an excellent series of text-figures, which show the arrangements in a semi-diagrammatic, but clear and accurate, manner. In the case of mammals of which the author has not been able to procure specimens for dissection, he quotes from the existing descriptions of other authors such details as apply to the problems which are the object of his investigation. Thus the memoir before us gives an account, which is practically complete, of what may be called the general morphology of the mammalian intestinal tract, that is to say, of that portion of the gut comprised between the stomach and the anus. From his investigations the author arrives at a number of interesting conclusions, of which only a few can be mentioned in the limits of this article.

Starting from an ancestral type of vertebrate, in which the alimentary canal ran a straight course through the body, suspended by a mesentery from the dorsal wall of the body-cavity, the gut becomes thrown into a series of folds as the result of a process of growth, whereby it becomes longer than the straight length between its extreme points. The process of elongation can be traced both phylogenetically, by a comparison of different vertebrate types, and ontogenetically, in the development of any given species. The more or less complicated folding of the gut which results involves the dorsal mesentery, and also the blood-vessels draining from the different parts of the gut, which tend to take short circuits between portions of the gut approximated to each other by the process of folding.

The intestinal tract, in both birds and mammals, is divided into two regions, anterior and posterior, by the outgrowth at a certain point of a cæcum or pair of cæca. Probably in all cases a pair of cæca were primitively present, as is usually the case in birds. In mammals, as a general rule, a single cæcum is formed, but in some cases two complete cæca, or a rudiment of a second in addition to the usual one, still occur. In a few cases, however, all trace of a cæcum has disappeared entirely. The intestinal tract anterior to the cæcum is divisible into two regions, the duodenum and the small intestine, or "Meckel's tract," as the author proposes to call it. The latter represents only a very short portion of the primitive straight gut, not more than two or three body-somites; but in nearly all birds and mammals it becomes the longest portion of the gut, growing out to form the greater part of what is known as the "pendant loop" in mammalian embryology, and is the chief absorbing portion of the gut. The intestinal tract behind the cæcum may be called the hind-gut, and corresponds to a much larger portion of the primitive straight alimentary canal than the duodenum and Meckel's tract together. In birds the hind-gut is relatively very short. In mammals, however, it is always long, sometimes extremely so, and becomes divided into two regions, the colon and the rectum. The colon is often greatly lengthened, and thrown into loops or coils. The rectum may also be considerably lengthened, but, as a rule, it is not very much longer than the portion of the primitive straight gut which it represents.

In certain groups of mammals a very primitive type of intestinal tract is still found. As the author points out, however, likenesses which are due to the common possession of primitive features, once possessed by the whole group, cannot be regarded as evidence of near relationship. Equally useless for proof of affinity are resemblances due to the loss or reduction of parts that were once the property of the ancestral stock. Clues to affinity must rather be sought in resemblances depending on definite anatomical peculiarities that are new acquisitions, and the more