to the most recent literature of this subject, *Heliopora* was thus transferred with reference to the structure of its corallum only, the living animal having been but imperfectly if at all observed.

In the course of my professional investigations of the fisheries of Torres Straits I have on several occasions obtained specimens of *Heliopora*, but had hitherto been unsuccessful in observing the living animal. Last year I obtained this coral on the Warrior Reef near New Guinea, but while apparently living when collected, and kept for days on board ship with the water continually changed, the zooids refused to make their appearance. Through the courtesy of Captain Dawson, R.N., and the officers of H.M.S. *Rambler*, I have this season journeyed north in that ship, and was afforded the opportunity of conducting a series of investigations in the neighbourhood of the Adolphus Islands, off Cape York, close to the scene of the recent *Quetta* wreck, and with relation to which the *Rambler* had been told off to make a careful survey.

At low spring-tide on the reef adjacent to the "Mid-Brother" rock, I came across a luxuriant growth of *Heliopora*, and was fortunate on this occasion to accurately determine the nature of the fabricators of this remarkable coral. The first living manifestations presented, and those visible only with the aid of a pocket lens, were the protrusion of a transparent body and two elongate tentacles from the numerous circular pores with which the corallum is studded. At first sight some near affinity of the animal to the bitentaculate Hydrozoon *Lar sabellarum* of Gosse was suspected. The movements of the zooids during extension and retraction were, however, more active than those which usually obtain among the Cœlenterata, and together with their general aspect and comportment suggested a nearer relation to the Annelida. This last-named section of the Invertebrata was found on a closer examination to represent their actual position in the zoological scale. On splitting one of the smaller flattened branches of the coral perpendicularly and parallel with its wider axis, I found that the entire coronid system was exposed to view. The little annelid fabricators, having an average length of one-fifteenth of an inch, wriggled into the water in every direction, a large number at the same time remaining passively in the tubular chambers which they originally constructed.

The most prominent external characters of the annelid of *Heliopora cerulea* consist of the bitentaculate head and six pairs of lappet-like branchiæ, which originate in segmental pairs on the dorsal surface and commence about the sixth segment posteriorly from the head. Fine isolated or paired setæ are developed in duplicate on the majority of the residual segments, and two brush-like fasciculi of closely adpressed setæ are conspicuous on the dorsal aspect of the penultimate and anti-penultimate caudal segments. On my return to Brisbane a few weeks hence, I purpose preparing and remitting a more detailed account, with illustrations, of the organization of *Heliopora*. In the interim it has occurred to me that this brief announcement of its nature may prove of interest to many of your readers, more especially as it may assist in throwing fuller light on the affinities of the many fossil genera that have hitherto been affiliated with this type among the Cœlenterata, but which in common with *Heliopora* should probably find their true position among the more highly organized section of the Tubicolous Annelida.

W. SAVILLE-KENT,
Commissioner of Fisheries, Queensland.
Thursday Island, Torres Straits, June 18.

Chambers's "Hand-book of Astronomy."

As the writer of the article on "Spectroscopic Astronomy" in the above work, I should like to be permitted to comment upon two points wherein your reviewer has, though doubtless inadvertently, scarcely done me justice.

On p. 292 (NATURE of July 24) the reviewer says that I have "*selected* certain determinations and arranged them in parallel columns to demonstrate the efficiency of the method adopted." The reference is to the comparison which I gave of the results obtained by Dr. Huggins, Mr. Seabroke, and at Greenwich, for motions of stars in the line of sight. But I made no selection. I took *all* the stars that had been observed at two or more of these Observatories, and gave the mean of *all* the observations of each star. I might further add that I think your reviewer is scarcely fair in his description of the discordances of my observations: expressed in wave-length, the average difference from the mean is but a small fraction of a tenth metre. But this is an unimportant matter compared with the suggestion that I have published a "selected"—that is, a "cooked"—comparison.

Then your reviewer complains that I make no reference to Prof. Vogel's observations of Algol, whilst I give my own "later division" of my observations into groups. I made no reference to Prof. Vogel's observations, because they were not published until some considerable time after the final revise of my article had been passed for press; whilst, so far from my division of my observations into groups being later than Prof. Vogel's work, it was two full years earlier, having been communicated to the Royal Astronomical Society in January, 1888, by the Astronomer-Royal (see *The Observatory*, vol. xi. p. 109). I also gave my results in one of the Gresham Lectures, Easter, 1888.

E. W. MAUNDER.

Royal Observatory, Greenwich, S.E., August 1.

I REGRET that my words allowed the interpretation which Mr. Maunder points out, for I had no intention of insinuating that the comparisons were "cooked." What I take exception to is that, according to the values given, γ Cassiopeiæ has a motion in the line of sight of -12, although on February 19, 1887, Mr. Maunder determined it as $-54·2$, and eight minutes afterwards as $+60·9$; and again, β Pegasi is stated to have a motion in the line of sight of -8, although in November 1881 two determinations, made within ten minutes of each other, differed by nearly 114 miles per second. It would seem, therefore, that in making a tabular statement, even of the mean of such values found by different observers, the magnitude of the probable error should be mentioned; for, as I remarked at the time, "To one unacquainted with instrumental difficulties, the motion of stars in the line of sight would appear to be a quantity that may be determined with some accuracy," whereas this is not the case. I have no intention of questioning Mr. Maunder's skill as an observer, but the fact that the discordances, when expressed in wave-lengths, are very small, only supports my contention that, until more perfect instrumental conditions are possible, many of the values are useless, and their determination an affectation of accuracy.

Mr. Maunder has himself to blame for my want of information with respect to Algol. He gives no reference to the report of the remarks made by the Astronomer-Royal in January 1888, and his own comments, at the meeting of December 1889, upon Prof. Vogel's work, led me to suppose nothing had been done previously.

THE REVIEWER.

Gregory's Series.

GREGORY'S series, on which are founded nearly all the methods of obtaining the approximate value of π, is made to depend, in works on trigonometry, on De Moivre's theorem and results flowing from it.

The following does not require the use of $\sqrt{-1}$, but depends only on two things—that the circular measure of an angle and its tangent are practically equal when the angle is indefinitely small, and that $\tan(A - B) = \dfrac{\tan A - \tan B}{1 + \tan A \cdot \tan B}$.

Let

$$\tan\theta \equiv \tan(a_0 + a_1 x + a_2 x^2 + \&c.) = x;$$

$$\therefore \tan\{a_0 + a_1(x+h) + a_2(x+h)^2 + \&c.\} = x + h;$$

$$\therefore \tan h \,.\, \{a_1 + 2a_2 x + 3a_3 x^2 + \&c. + \text{terms involving } h, \text{ say H}\} = \frac{h}{1 + x(x+h)};$$

$$\therefore \frac{\tan h\{a_1 + 2a_2 x + 3a_3 x^2 + \&c. + H\}}{h(a_1 + 2a_2 x + 3a_3 x^2 + \&c. + H)} = \frac{1}{\{1 + x(x+h)\} \,.\, (a_1 + 2a_2 x + 3a_3 x^2 + \&c. + H)}.$$

Let $h = 0$;

$$\therefore 1 = \frac{1}{(1 + x^2) \,.\, (a_1 + 2a_2 x + 3a_3 x^2 + \&c.)}.$$

Equating coefficients of like powers of x,

$$a_1 = 1,\ a_2 = 0,\ a_3 = -\tfrac{1}{3},\ \&c.;$$

$$\therefore \theta = a_0 + x - \tfrac{1}{3}x^3 + \&c.,$$

where evidently $a_0 = 0$, or a multiple of π.

Taking $\theta = \dfrac{\pi}{4}$,

$$\frac{\pi}{4} = 1 - \tfrac{1}{3} + \tfrac{1}{5} - \tfrac{1}{7} + \&c.$$

R. CHARTRES.