distance, the resulting positions and distances being all that is wanted. The volume is, however, a valuable addition to double star measurements.

The Ophiuridæ and Astrophytidæ of the "Challenger" Expedition. By Theodore Lyman. Part 2, Bull. Mus. Comp. Zool. Vol. vi., No. 2. (Cambridge, Mass.)

THIS is the second part of the preliminary description of the Ophiuridæ and Astrophytidæ dredged by the *Challenger*. Prof. Lyman issued the first part of the Prodromus some time ago. The Prodromus is of course merely an abridgment. Prof. Lyman's full account of the Ophiuridæ will appear in the large work on the *Challenger* Expedition. To the present part is added an index of species contained in the two parts, together with all others described elsewhere by Prof. Lyman. The whole forms a list of the greater portion of deep-sea Ophiurans and Astrophytons known. The list comprises fifty-three genera and about two hundred and twenty-three species. In the present part two new genera and sixty-three new species are described. Prof. Lyman considers that the Ophiuran which was recently described by Prof. Martin Duncan under the name of *Ophiolepis mirabilis* (*Linn. Soc. Journ. Zool.*, xiv. 460, 479), is a true Ophiopholis, lacking none of its characters, and standing quite near the typical *O. aculeata*. Priority is given in all cases by Prof. Lyman to specimens dredged by the *Challenger* over those obtained by the later series of dredgings carried out by the United States Government under Mr. Alexander Agassiz. A similar priority has been generously given by Mr. Agassiz to the *Challenger* Echinoidea, and Count de Pourtales has shown similar consideration in the matter of the corals. Owing to the delay in the publication of the *Challenger* results, the American naturalists could easily have secured priority for their collections, had they thought fit to do so. They have in their hands almost all the forms of any importance which the *Challenger* obtained, for by their continued operations they have dredged them nearly all on the United States coast and around the West Indies. The thanks of English naturalists is certainly due to the American zoologists for their courtesy in this matter.

LETTERS TO THE EDITOR

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.*]

[*The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to ensure the appearance even of communications containing interesting and novel facts.*]

The Density of Chlorine

THE article on the density of chlorine, bromine, and iodine at high temperatures which appeared in NATURE, vol. xxi. p. 461, places before your readers in the clearest manner the present condition of this important question. The conclusion hinted at in the closing sentences of the article, viz. that these gases are under certain circumstances decomposed, is however scarcely warranted. Dr. Armstrong thinks that these substances may be more liable to decomposition when in a nascent state. It is generally supposed that in this condition the atoms of a substance are separate, having as yet had no opportunity of selecting a mate for their further career ; if therefore we could observe the density of a gas in the nascent state, we should find that it was only half the theoretical density. In the case of chlorine evolved from platinum chloride at a high temperature we may readily imagine the emerging atom, set in rapid movement by the great heat, to be unable at any time to join with another to form a molecule; we should thus have the nascent state maintained, if I may be allowed the expression, as long as the temperature was high enough. It is further possible that there may be a wide interval between the temperature at which chlorine gas is molecular and that at which it is entirely atomic, and that in this interval a certain proportion of the gas varying with the

ture is resolved into its atoms, the rest remaining molecular. The gas would then have a density intermediate between the theoretical density 2·45 and its half, 1·23, a density in fact corresponding with that obtained in Meyer's experiments.

It may be urged that this attempt at an explanation, necessitating as it does a density varying with the temperature, is incompatible with the facts, since Meyer obtained a uniform density of about 16 in all his experiments. It must however be remembered that these observations cannot lay claim to great accuracy, and that the recurrence in several experiments of the same observed density may often be ascribed to chance.

Of this we have an excellent example in the experiments recently recorded in the *Proceedings* of the Royal Society by Prof. Dewar and Mr. Scott. The densities required were those of the vapours of potassium and sodium. In a first series of experiments which were made in an iron vessel the mean density of potassium vapour (referred to hydrogen) was found to be 40·8, that of sodium vapour 25·33, whence it was naturally inferred that those vapours were normal in character. In a second series of experiments, in which a platinum vessel was used, the densities 21 and 13 were found for potassium and sodium vapours respectively ; from this it was with equal reason inferred that these metallic vapours were atomic, and resembled that of mercury. Unless platinum has a special dissociating effect on the molecules it must be admitted that in the one series or the other (since they were both made at similar temperatures) the concordance of the results was due to chance.

That the density of chlorine is really subject to gradual variation as the temperature increases, is rendered very probable by the results obtained by Meyer with iodine ; tha table of these results given in the article referred to (NATURE, vol. xxi. p. 461) shows clearly that the density of iodine decreases gradually, and there would seem to be no reason whatever for the assumption that it is complete at about 1,500° C.

I fear that I trespass much on your space in thus trying to point out that the otherwise inexplicable density 1·6 most probably represents only a stage on the road to the complete dissociation of the molecules, a stage more readily reached by a nascent gas than by one in which the molecules have to be dissociated; the importance of the subject must, however, be my excuse.

Clifton College, Bristol, March 21　　　FRED. D. BROWN

The Annual Variation of the Barometer in India

IT has been pointed out by Mr. Archibald, in NATURE (vol. xx. p. 54), that the late Mr. J. A. Broun, F.R.S., was probably mistaken in supposing (see vol. xix. p. 6) that there is no direct causal connection between the annual variations of temperature and atmospheric pressure in India. Mr. Broun appears to have adopted this opinion because, at all places in India where the annual oscillations of temperature and pressure are considerable; their turning points are not the same. The highest pressure usually occurs about the middle of December, and the lowest at the end of June, while the lowest temperature is reached during the first ten days of January, and the highest in the latter half of May.

Having been employed a short time ago in calculating the constants of Bessel's formulæ for the annual variations of temperature and pressure at Allahabad, I noticed that the first term of the pressure formula, which includes nine-tenths of the total variation, reaches its maximum almost exactly at the time of lowest annual temperature. The value of this term at the middle of January is ·271ʰ sin 101°· 32′, and its maximum therefore falls about 11½ days before the middle of January, that is on January 4th or 5th. The same term of Bessel's formula for Benares is represented by ·279″ sin 102° 34′, and for Roorkee by ·258″ sin 103° 12′. The maximum pressure at these two stations therefore falls about the 3rd of January; if we take the oscillation of annual period alone. The first periodic term of the formula for the annual variation of pressure at Bombay is given by Mr. C. Chambers ("Meteorology of the Bombay Presidency," p. 16) as ·1405″ sin 87° 2″, the angle being counted from the 3rd of January at the rate of 30° for a month. This throws the maximum forward to the 5th January.

The pressure oscillation of full annual period may be supposed to represent the most important part of the effect of the annual variation of temperature, freed from all minor inequalities due to changes of wind and other causes. The close coincidence of the time at which this pressure oscillation attains the time of the temperature minimum at the