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 insure the appearance even of communications containing interesting and novel facts.]

"Gas-Burners, Old and New"

PERMIT me to point out a very obvious clerical error in the notice, in last week's NATURE (p. 270) of my little work having the above title, and to make a few remarks concerning your criticisms on the book. In the sentence, "Owen Merriman has taken pains to insist on the two great desiderata of gas-burners—high temperature and low temperature," the latter word is doubtless intended for *pressure*; and the sentence should read "high temperature and low pressure." It would have been scarcely necessary to make this correction, but that the notice may perhaps be read by many who are incapable of suggesting the correct reading, and to whom therefore the sentence as it stands will be absolutely meaningless.

While fully appreciating the kindly nature and intent of your criticisms, I cannot pass by, without a word of defence, your statement that you think I have "gone too far in attempting to give a popular theory of luminous combustion." I hope to be able to show that the particular extracts from that portion of the book to which exception is taken are practically correct, and, so far as could be looked for in a work addressed to miscellaneous readers, sufficiently precise. To this end I will deal with the various extracts *seriatim*. That "the various gases which constitute ordinary coal-gas do not all burn together in the flame" is a matter I had thought to be established beyond reach of dispute. But if evidence is required of the truth of the assertion, I need only point to a table prepared by Prof. Landolt, showing the composition of gases in the different parts of a gas flame, which is given by Prof. T. E. Thorpe, F.R.S., in a lecture on "Flame," forming one of the Manchester series of Science Lectures (Manchester: John Heywood). By this table it is clearly shown that in a gas flame, $3\frac{1}{2}$ inches high, the olefines, or heavy hydrocarbons, do not diminish in amount until a height of 1.58 inches is reached; while the proportion of hydrogen is considerably diminished at a height only of 0.39 inch. Although it may not be mathematically correct to say that "the amount of light developed by any coal-gas flame is directly proportional to the degree of intensity to which the temperature of the carbon particles is raised," seeing that the light emitted is not in *exact* proportion to the temperature of heat, the statement is sufficiently correct for a popular treatise. What was chiefly intended to be enforced was that the amount of light evolved from a gas flame increases with its temperature, and in such a work a mathematical degree of exactitude is hardly looked for. Now, with regard to the other matters which are raised. To account for the destruction of luminosity which occurs when air is introduced into a gas flame, two theories have been put forward. According to the first, the heavy hydrocarbons at once meet with sufficient oxygen and are immediately consumed, without their carbon being first raised to a white-hot state; but this theory alone will scarcely explain the phenomenon, seeing that the effect of pure oxygen is to increase the luminosity of a flame. The other and more rational theory—and the one which is more generally accepted—supposes that the inert nitrogen which is thereby introduced reduces the heat-intensity of the flame "below the temperature required to decompose the hydrocarbons." It may be that to some extent both causes are at work. Lastly, as to the relative temperatures of a luminous and a non-luminous flame. Although the *average* temperature of the latter is higher than the former—as indeed it must be, seeing that the same *quantity* of heat is contained in a less space, the non-luminous flame nowhere develops so high a temperature as is found at certain of the hottest portions of the luminous flame. Mr. R. H. Patterson, in an article on the action of the blowpipe considered with reference to the principles of gas illumination (*Journal of Gas Lighting*, &c., vol. xxxv. p. 831), states that in the luminous region of an ordinary gas flame he has succeeded in melting a platinum wire: a result which he could never attain with a non-luminous flame."

July 21

"OWEN MERRIMAN"

[We thank our correspondent for pointing out the clerical

error "low temperature" for "low pressure" in our article. We consider that the sentence, "The various simple gases which constitute ordinary coal do not all burn together in the flame; the temperature required to effect their ignition being lower for some of them than for others," is misleading. The ordinary reader would understand this to mean that the constituent having the lowest ignition point catches fire and burns away first, and then the constituent of next lowest ignition point catches fire and burns away, and so on; whereas Blochmann's researches show that the combustions are not distinct, but that the *rate* of combustion of the hydrogen is greater than the rate of combustion of the other inflammable gases.

We do not think it "sufficiently correct" to say that the intensity of light is *directly proportional* to the temperature of the coal-gas flame: perhaps it would be nearer the mark to say that the intensity of the light varies as the fifth power of the temperature within certain limits. The admission of air into the Bunsen flame destroys the luminosity more by *dilution* and *oxidation* than by *refrigeration*.—ED.]

The "Cotton-Spinner"

IN a note on this rare British Holothurian (published in NATURE on June 12, p. 146), I drew a distinction between the kind of observations that were possible to a student in a museum and to one who was working at a laboratory specially adapted for biological investigation and situated on the sea-shore.

The experiences of the last few days have shown me only too well that this distinction was not overdrawn or too refined. By the kindness of Mr. John Snell of Truro, I have been favoured with two consignments of the "Cotton-Spinner;" three specimens which reached me on Monday by parcels post gave very sufficient evidence of having died some hours before. This mishap induced me to propose to Mr. Snell that he should send me specimens by express, and entrust them to the charge of the guard of the train; for this suggestion I am indebted to Dr. Günther. Mr. Snell not only did this to-day, but he was good enough also to warn me by telegram that the specimens would reach Paddington at 8 p.m. this evening. I was at the station to meet them, and I have no doubt that the comparatively fresh condition of the sea water was due to the attention of the guard of the train. Notwithstanding all this care and trouble, the three "Cotton-Spinners" were dead.

I have given this detailed, and, I fear, tedious exposition of the whole case, because it seems to me to clench the argument that the problems of the physiology of marine forms, and especially of those less-known creatures which live at a depth of—like the "Cotton-Spinner"—ten to twenty fathoms, are not soluble at some distance from the coast, however great be the trouble or the care that is taken in forwarding them. We must have a laboratory on the sea-shore.

The only fact that I have been able to observe is that the threads of the "Cotton-Spinner" do undoubtedly attach themselves to objects in their vicinity: one of the specimens obtained this evening was attached to sea-weed; from the cloacal orifice a connected strand of threads, about one-fifth of an inch in width and an inch in length, spread out at its free end into a number of more free threads which had attached themselves to the seaweed which had been placed in the water; they extended over about two inches in breadth. From what I have learnt of the extensile and swelling power of these threads, I should take it that about as much had been expelled as would occupy the greater part of the cloacal cavity. A woodcut illustrating the cloacal cavity so filled by tubes, and drawn from a spirit specimen preserved in the British Museum, will be given in my paper on this animal, which will be published in the next (October) part of the *Proceedings* of the Zoological Society.

August 1

F. JEFFERY BELL

Krakatoa

I MOST respectfully beg to point out to you a few errors made in the English version of my "Short Report on the Krakatoa Eruption," published in NATURE, May 1.

It says on p. 15:—"In this eruption very curious objects were ejected, *i.e.* very smooth, round balls, resembling marbles, to the size of $1\frac{1}{2}$ to 6 centimetres in diameter. They are full of acids; they contain 55 per cent. carbonate of lime," &c.

The words italicised are wrong. The original says: *Zij Cruisen sterk met Zuren*, which means "they strongly effervesce when