

is published by the Committee of the Palestine Exploration Fund, but is merely preliminary to the publication of the various detailed memoirs and the unprecedentedly minute map which are in preparation. It is mainly the narrative of Lieut. Conder's personal work and adventure, but besides its strong interest as a record of adventure in one of the most interesting countries in the world, it contains a vast amount of information and discussion concerning the many places so full of sacred associations to all Christian peoples. The work of the Survey was often pursued under considerable hardships, and occasionally at some risk, and more than one of the staff had to succumb during the progress of the work. It is evident that this most interesting of surveys has been executed with a minuteness and a care that leave little to be desired. The survey was actually commenced at the end of the year 1871. Capt. Stewart, the first officer in charge, had to come home on account of his health, and in July, 1872, Lieut. Conder took up the command, and completed four-fifths of the survey, the remaining fifth being carried out in 1877 by Lieut. Kitchener. The great map now extends over 6,000 square miles, from Dan to Beersheba, and from the Jordan to the Mediterranean Sea. This map is being prepared in twenty-six sheets; and an idea of its minuteness may be obtained from the fact that it will show tombs, caves, cisterns, wells, springs, rock-cut wine-presses, remarkable trees, and even the Roman milestones. Accompanying the map will be a memoir prepared by Lieut. Conder under the direction of Major Wilson and Mr. George Grove. It is hoped that all will be ready for publication in the course of a few months. This memoir will contain a vast collection of varied information gathered from many sources, and with the map will undoubtedly be of infinite service to students of the Biblical narratives. Lieut. Conder's work will amply repay careful study, and the many illustrations of places whose names are "familiar as household words," add greatly to its interest and value.

#### 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.]

#### Discovery of Vulcan

A LETTER from the Astronomer-Royal, in NATURE, vol. xviii. p. 380, giving the exact position of  $\theta$  Cancri on the day of the total solar eclipse, intimates that, as the position given by Prof. Watson of the intra-Mercurial planet discovered on that day agrees so closely with that star, it may have been the object discovered, I have thought it advisable to give the facts concerning it, in order to correct such an impression if it still exists. That he had a view of the planet as stated there is no doubt, for I myself saw it some four or five minutes later, using  $\theta$  as a comparison star, and am able not only to corroborate the discovery, but to substantiate the position given by him. Its proximity to  $\theta$  enabled me to estimate its position with great exactness, especially in declination. It may be well here to state that I was prevented from searching to the east of the sun, in consequence of forgetting to untie a string with which I had tied, to the eye end of the telescope, a long pole to prevent the wind from shaking it, the end resting on the ground not allowing the instrument to be moved to the eastward. It is undoubtedly to this circumstance, which at the time seemed untoward, that I owe the discovery of Vulcan. In my eagerness to discover this hypothetical planet I had decided to ignore nearly all of the phenomena attending the eclipse, and as, at the commencement of total phase, there was visible neither the chromosphere nor any protuberances—nothing, in fact, but the corona, I almost immediately began the sweeps for it; but my hampered telescope behaved badly, and no regularity in the sweeps could be main-

tained. Almost at once my eye caught two red stars about  $3^\circ$  south-west of the sun, with large, round, and equally bright discs, which I estimated as of the fifth magnitude, appearing (this was my thought at the time) about as bright in the telescope as the pole star does to the naked eye. I then carefully noted their distances from the sun and from each other, and the direction in which they pointed, &c., and recorded them in my memory, where, to my mind's eye, they are still distinctly visible. I then swept southward, not daring to venture far to the west for fear I should be unable to get back again, and soon came upon two stars resembling in every particular the former two I had found, and, sighting along the outside of the tube, was surprised to find I was viewing the same objects. Again I observed them with the utmost care, and then recommenced my sweeps in another direction, but I soon had them again, and for the third time in the field. This was also the last, as a small cloud hindered a final leave-taking just before the end of totality, as I had intended. I saw no other stars besides these two, not even  $\delta$ , so close to the eastern limb of the sun. The distance between them was about  $7'$  or  $8'$ .

By three careful estimates the two stars pointed exactly to the sun's centre. When it is considered that a deviation of not over  $15''$ , in two objects so close, will cause them to point considerably to one side of the centre of the sun—three degrees away—it may be assumed that its declination was quite correctly estimated. Thus far all seems clear and free from doubt, but it is just here where the trouble begins, for, unfortunately, I could not tell which was the star and which the planet. Happily Prof. Watson comes to the rescue, and with his means of measuring, says "the planet was nearest the sun."

The Astronomer-Royal gives the place of  $\theta$ , on that day, as in R.A. 8h. 24m. 40s., Decl.  $+18^\circ 30' 20''$ . From this I deduce the position of the planet at 5h. 22m. Washington M.T. to have been in

R.A. 8h. 26m. 40s.

Decl.  $+18^\circ 30' 25''$ .

This is a close approximation to that given by Prof. Watson. It is to be hoped that a comparison will determine the position in its orbit, whether it was approaching superior conjunction, as Watson thinks, or, as appears most reasonable to me, had just passed its inferior conjunction. LEWIS SWIFT

Rochester, N. Y. September 4

#### The Respiration of Plants

I DESIRE, with your permission, to give publicity in the columns of NATURE to the results of some observations on the above subject, communicated by me to the Royal Society of Victoria on June 13. As the facts to be mentioned are not referred to in Sachs' "Text-book of Botany," in the dictionaries of chemistry of Watts and Wurtz, or in recent volumes of the *Journal of the Chemical Society* or the *Chemisches Centralblatt*, I presume that they are little, if at all, known to botanists. I have found, first about nine years ago, and have more systematically observed lately, that fresh sections of many fruits, such as the apple and pear, and other vegetable structures as the potato, turnip, &c., give the reactions considered to be characteristic of ozone, viz., causing separation of iodine from iodide of potassium, and turning tincture of guaiacum blue, the intensity of these reactions varying in different samples of the vegetable substances, but depending mainly on their comparative freshness. I have further found that the same structures contain a substance which acts as an *Ozonträger*, to use Schönbein's expression, a substance which transfers ozone from peroxide of hydrogen and similar articles. This is shown by the fact that if the guaiacum is not blueed at all, or only to a slight extent, the blue colour becomes very marked when a drop of ethereal solution of peroxide of hydrogen is added. I infer from these observations (1) that the oxygen inhaled by living plants, and even by pulled fruits for a time, is ozonised or rendered active, probably by entering into loose combination, as is the case with the oxygen in the blood of animals; and (2) that it is probable, though not proved, that the ozone-transferring substance existing in almost every fresh vegetable structure is that with which it is loosely combined, as the oxygen in the blood is with the hæmoglobin of the red corpuscles, which is a very active *Ozonträger*. This element in plants is gradually destroyed as decay comes on, and ceases to perform its