

Ruwenzori"). M. Foà made considerable collections of fish in Central Africa, of mollusca, insects, spiders, ticks, and crustaceans. He also brought back *Medusæ* from Tanganyika. These *Medusæ* serve as a text for a very interesting article by M. Charles Gravier on the *Medusæ* of the Victoria Nyanza, of Tanganyika, and of the Niger basin. Perhaps the most important contribution to this *recueil* is the treatise by M. Louis Germain on the molluscs of Tanganyika, notably those collected by M. Foà. M. Foà's own remarks on the tsetse fly are worthy of attention.

H. H. JOHNSTON.

THE PLANET MARS, 1890-1901.

La Planète Mars et ses Conditions d'Habitabilité. By Camille Flammarion. Tome ii., Observations faites de 1890 à 1901. Pp. 604. (Paris: Gauthier Villars, 1909.) Price 12 francs.

IN the year 1893 we had the great pleasure of giving our readers some account (vol. xlvii., p. 553) of the very excellent and complete summary of the observations of the planet Mars, made between the epochs 1636-1890, compiled by the distinguished French astronomer, Monsieur Camille Flammarion. This work, containing no fewer than 604 pages, presented us with a most interesting survey of the progress made in enumerating and deciphering the markings observed on the planet's surface. It commenced with the earliest known observation of the planet, namely, that of the Neapolitan astronomer Fontana, on August 24, 1638, who wrote:—

"1636. Martis figura perfecte spherica distincte atque clare conspiciebatur. Item in medio atrum habebat conum instar nigerrimæ pilulæ.

"Martis circulus discolor, sed in concava parte ignitus deprehendebatur.

"Sole excepto, reliquis aliis planetis, semper Mars candentior demonstratur."

The volume concluded with the observations made in the year 1890, including the first photographs of the disc of Mars made by Prof. W. H. Pickering at Mount Wilson, California, on April 9.

In Martian cartography the year 1890 seems to-day a very long time ago. The pioneers did their work well, and the great tradition which fell on the shoulders of those who were busy with Mars up to 1890 was well maintained, and a great amount of new knowledge secured. Since that year the attack on the planet, to unravel the secrets of its visible features, has been no less severe, and to-day the knowledge gained is only a new incentive to further research.

If we were to be asked to state three or four of the more recent and most important discoveries in relation to the planet Mars, we should be inclined to say as follows:—

(1) That the dark areas on the planet which were considered to be seas have been shown to be traversed by permanent lines, and that, therefore, the water surface explanation had to be abandoned (Pickering and Douglas, 1892).

(2) The successive development of the canals according to the Martian seasons (Lowell).

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(3) The photography of the canals themselves (Lampland, 1903-5).

(4) The photography of the spectrum of water vapour in the Martian atmosphere (Slipher, 1908).

While the above may be considered as four of the important results secured since 1890, there is a host of many other valuable advances which will be found recorded in the volume under review.

Monsieur Flammarion has done his work exceedingly well, and, with masterly instinct, describes, fits together, and discusses the observations, made between the years 1890 and 1901 by a very great number of workers, in a logical and interesting manner.

Before commencing to give in detail the observations of the first epoch, 1892, he rightly refers at some length to the fine memoir published in 1896 by the celebrated Italian astronomer, M. Schiaparelli, the discoverer of the canals. This memoir is devoted to a discussion of his observations of the Opposition 1883-4, while a sixth memoir, published in 1899 and here referred to, contains his observations made at the Opposition of 1888.

Space does not allow us, nor indeed is it necessary, to enter into any detail into the successive series of observations which are here marshalled together. The reader must be left to peruse the volume himself and form his own conclusions, but even he will be astonished at the wealth of matter which is brought together under one cover.

As in the previous work, there is a great number of illustrations accompanying the text, and these add materially to the understanding of the changes of Martian features.

At the end of the volume, M. Flammarion, with the help of M. Antoniadi, has constructed a key-map of the surface features of the planet, which gives us an idea of the complicated system of markings which is the result of the observations up to the year 1901.

As has been mentioned above, some important additions to our knowledge of Mars have resulted from observations of more recent date, and we can only suppose that M. Flammarion has in hand vol. iii., which will, we hope, in due course be published, and be as valuable a contribution to astronomical science as its two predecessors.

In conclusion, we may quote M. Flammarion's remarks with regard to the habitability of Mars, since the subject has recently been prominently brought forward:—

"Mais il me semble que, dans toutes ces interprétations, je suis moi-même un peu terrestre. Il y a sans doute là d'autres éléments, non terrestres, mais martiens, ou, tout au moins, des conditions toutes différentes de celles de notre habitation. Que cette planète soit actuellement le siège de la vie, c'est ce dont témoignent toutes les observations. Mais il nous est encore impossible de nous former aucune idée judicieuse sur les formes que cette vie a pu revêtir, formes assurément différentes de nôtres. Un mystère impénétrable enveloppe encore aujourd'hui ce passionnant problème, qui est, en définitive, quoi qu'on en passe, le but, peut-être inaccessible, de toutes les recherches de l'Astronomie planétaire. Mais ne désespérons jamais! Qui sait ce qui sommeille dans l'inconnu de l'avenir?"

WILLIAM J. S. LOCKYER.