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Schiaparelli: the most appropriate name for the ExoMars programme

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Abstract. It was the year 1877. Mars was in opposition. On this date Schiaparelli started his observations of Mars' surface, which he systematically observed for the following ∼30 years. The echo of the sensation and the admiration stirred by the incredible results and pictures that Schiaparelli drew of Mars lasts to these days. Schiaparelli's name is undeniably linked to Mars for astronomers and lay people alike: his discoveries, maps and canals have granted him everlasting fame and influence in many aspects of science, culture, literature and everyday life. This more than justifies naming the ExoMars mission "**Schiaparelli**".

1. Introduction

Let's start with a brief review of what was known about Mars at the time Schiaparelli started his observations of the red planet. Padre Secchi had published many drawings of both hemispheres and introduced the term "canali" to describe some long features visible on the surface of the planet. In 1867, W. Huggins presented a spectroscopic confirmation of the presence of water vapor in the atmosphere (Huggins 1867). R. Proctor published a first map of Mars which showed structures named 'continents", "seas" and white polar caps, "ice" caps according to Herschel.

2. Schiaparelli, the scientist, and Mars

In this panorama, Schiaparelli's regular observations started, and were duly recorded in his

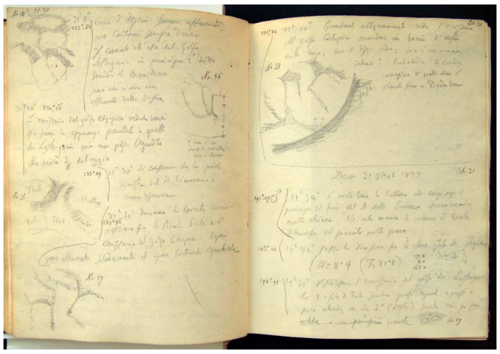

Fig. 1. A drawing of Mars in Schiaparelli's diary in October 1877. From "Le Mani su Marte", Archive of the Osservatorio Astronomico di Brera.

diaries, which constitue the principal source of information of our knowledge of his work[1] (see Fig. 1). His observations were character-

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[1] see http://www.brera.inaf.it/docM/OAB/MARTE/index_marte.html

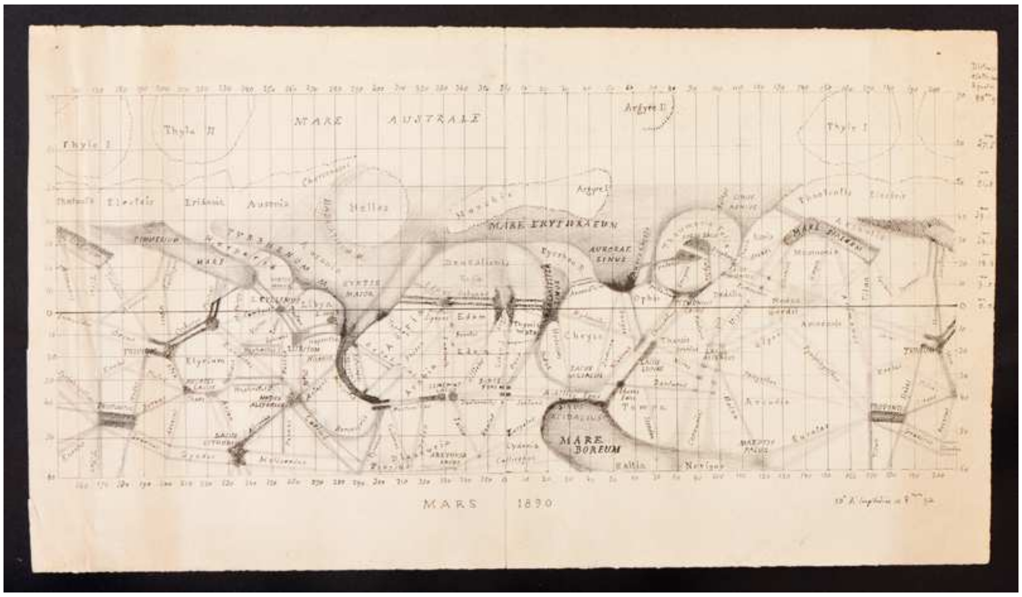
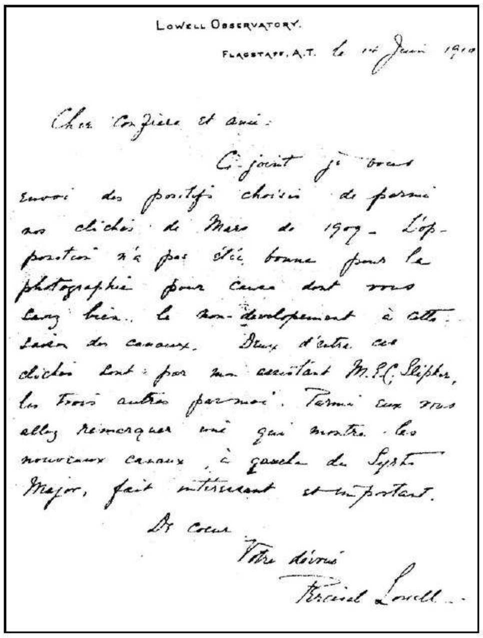


Fig. 2. Map of Mars based on drawings taken during the opposition of 1890. Archive of the Osservatorio Astronomico di Brera.

ized by two passions and skills he had developed: meteorology and geology. This is evident in the first long report he gave in 1878, where he talks about his methodology and aims: "I meant to describe Mars with geometrical methods and principles, rather than with disks or painting based on visual impressions" (Schiaparelli 1878). Applying cartographical methods used on Earth to Mars topology he started a new discipline: *aerography* . He used micrometric measures of 62 locations on the surface of Mars to determine the axis of rotation and to draw new maps of the planet, quite different from Proctor's. Different locations that looked like Earth's structures, such as dark areas, the "seas", and lighter areas, the "continents", were named after ancient geography and mythology.

To enhance similarities with the Earth, polar caps showed periodic variations tightly connected with seasons. Schiaparelli followed the current belief that the caps resulted from the condensation of the water vapor in the planet's atmosphere. Only towards the end of his memoirs, for the first and only time in writing, Schiaparelli tried a personal interpretation of the observations. Polar ice, indicative of a specific circulation in the atmosphere, feed "canali" which funnel water in the lower parts of the planet, where seas form. The word "canali" assumed then the meaning of an artificial constructions, which would consequently imply the existence of intelligent forms of life, capable of such projects. Flammarion jumped on this idea and propagated it to the public at large. As a result, Schiaparelli was even more hesitant to comment in writing on the major changes he saw during the opposition of 1879-1880 relative to his observations two years previously, since he was not at all convinced of Flammarion's transposition of his thoughts. During the following opposition, in 1881-1882, Schiaparelli observed "geminations" for the first time, splitting of channels in two parallel ones. He continued to publish new maps of Mars until 1890 (Fig. 2), which became richer in particulars without substantial changes from previous ones.

In 1893 he published an article on "Natura ed Arte" (Schiaparelli 1893) where he described myths and legends relative to the red planet, which symbolizes the War God. His


LOWELL OBSERVATORY.
FLAGSTAFF, A.T. le 14 Juin 1910

Cher Confrère et ami:

Ci-joint je vous envoie des positifs choisis de parmi nos clichés de Mars de 1907. L'opposition n'a pas été bonne pour la photographie pour cause dont vous savez bien, le non-développement à cette saison des canaux. Deux d'entre ces clichés sont par mon assistant M. E.C. Slipher, les trois autres par moi. Parmi eux vous allez remarquer une qui montre les nouveaux canaux à gauche du Syrtis Major, fait intéressant et important.

De cœur

Votre dévoué

Percival Lowell

Fig. 3. The last letter written by Lowell to Schiaparelli on 14 June 1910. It is in French, their common language. It is likely that Schiaparelli was never able to read it and learn about the two new "canali" that appeared left of the Syrtis Major.

suggestion that the observed structures on Mars' surface could be viewed as true "hydrographic system", possibly created by natural causes, like the English Channel, but perhaps the result of work of intelligent beings, to provide a mechanism by which "water (and with it organic life) may be diffused over the arid surface of the planet".

Both an underlying desire common to his epoch (shared by his contemporaries) to show that life was possible on other planets in the Solar System and the spectroscopic observations of Hermann Vogel that suggested the existence of a Martian atmosphere rich in water vapor, probably led support to the artificial interpretation of the "canali". The existence of a water vapor on Mars was disproved by W.W. Campbell in 1894, who demonstrated that it actually belongs to the Earth's atmosphere (Campbell 1894). At the same time, skepticism was growing about the reality of the structures Schiaparelli observed.

Soon it became clear that Mars atmosphere contains only heavy gases such as nitrogen, argon, carbon dioxide, that polar caps are made of solid carbon dioxide, "canali" are a optical illusion and so are geminations.

Schiaparelli remained of his opinion: in particular, while he could accept that "canali" were not artificial, and that life did not exist on Mars (but see his correspondence with Percivall Lowell in the years 1869-1910, Manara & Chlistovsky 2004 and Fig. 3, and his last article on Natura ed Arte in 1909, Schiaparelli 1909), he never could believe that the lines he saw on Mars did not exist!

But what is the relevance of his work and his results, in spite of this all? He was the first to apply rigor and scientific methodology to an area where free-style drawing and often fantasy where used to describe the surface of the planets. With precise measurements and micrometric transcriptions of the features on Mars' surface he made a topographic transcription of the same kind as that applied to the Earth's surface. *For this reason he can be considered the father and founder of modern planetology.*

Even today, with space instruments giving us a detailed picture of Mars vaguely reminiscent of the structures drawn by Schiaparelli, Mars topography is based on the nomenclature he used in his maps.

3. Conclusions

While alive, he was awarded prestigious prizes and medals. He was named in the Senate of the Italian Kingdom and his opinions and results were highly valued by his contemporaries. Today, the name Schiaparelli can be found in many contexts: an asteroid, a lunar and a martian crater, a mountain chain on Mercury are named after him. Streets with his name can be found in various cities around the world, and stamps have been issued with his portrait (Fig.4). More than this, we can now appreciate the influence and the legacy that he has left us. In a recent meeting held in October 2010, "Schiaparelli and his legacy",

Fig. 4. The stamp issued by the Italian Postal Service in the year 2010 to celebrate G.V. Schiaparelli

on the occasion of the centenary of his death, different aspects of his past achievements and present legacy in a broad scientific context and even everyday life have been presented and discussed. For all this, we strongly believe that the name "Schiaparelli" is a perfect match to the ExoMars programme: an important rigorous astronomer, a famous scientist and a person with vast culture and scientific value.

All information on the ExoMars programme can be found at `http://exploration.esa.int/`.

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