COOPERATIVE LANDER-ROVER BIOMORPHIC EXPLORERS MISSION

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When exploring a new terrestrial/planetary surface *in situ*, the challenge is to be able to quickly survey and select the sites of interest. Imaging done from orbiters currently allows broad coverage but at limited spatial resolution; ~ 60 cm to 1m/pixel. Descent imaging may provide a context for landed vehicles; however, it is not broad enough to plan exploration paths/areas for a rover or to characterize potential sample return sites. Images taken from surface-sited landers/rovers with masts ~1- 2 m high do not cover the surroundings adequately far from their location. Coverage of a large area is warranted, and close up imaging (~5 – 10 cm resolution) and in-situ imaging at even greater resolutions is desired. The essential mid-range, 50 – 1000-m altitude perspective is as yet uncovered and is an essential requirement for exploration. Imaging from this mid-range is required to obtain details of surface features/topography, particularly to identify hazards and slopes for a successful future mission. For a planet with an atmosphere, such as Mars, flyers carrying cameras can provide the larger-scale visibility at the required spatial resolution within the context of orbiter and/or descent imaging. A cooperative lander-rover-biomorphic explorers mission is therefore suggested and illustrated in figure 1.

The mission objective is to perform close up imaging of 'over the horizon' terrain and perform in-situ surface measurements for site selection and sample return reconnaissance. A specific objective could be to obtain samples from potential exobiology sites and areas of geological interest on Mars. Valles Marineris on Mars is a potentially favored landing site because, by comparison with our Grand Canyon here on Earth, it is expected to be potentially rich in geological data in one single site.

The lander or rover-lander is equipped with several microflyers. A launching mechanism is used to launch the microflyer towards the target site specifying a flight heading. Launch energy could be provided by a small solid rocket, pneumatic thrust, compressed *in-situ* resource gas launch, a spring, electrically powered launch or a mechanism combining two or more of the stated techniques. The communication range is kept small (<10 km), and the lander local relay base is always available. Different flight paths over different terrains of interest are followed by the different flyers. Surface imagery is obtained using miniature camera systems on the flyers. The microflyer relays imagery/meteorological data to the lander and after landing conducts/deploys a surface experiment and acts as a radio beacon to indicate the selected site.

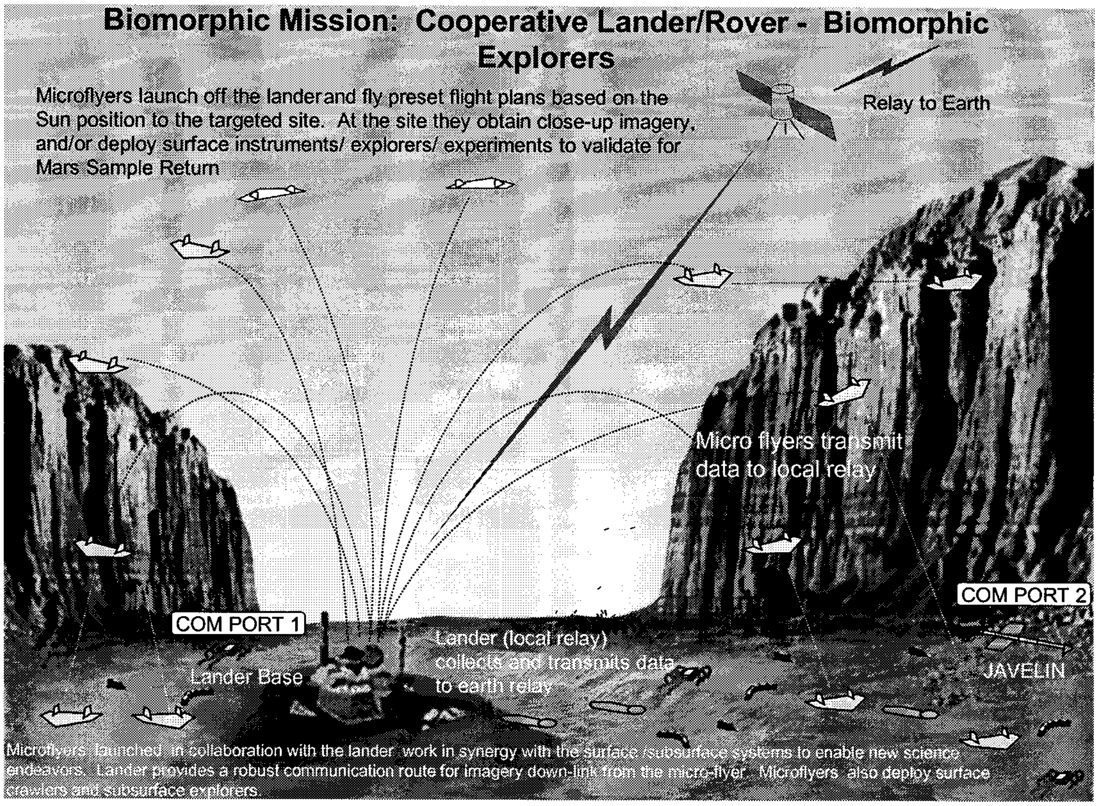

Figure 1: Biomorphic Mission: Cooperative Lander/Rover - Biomorphic Explorers

Microflyers launched from the rover/lander could also disperse other biomorphic multiterrain surface/subsurface explorers.

Time steps and stages in the implementation of such a mission will be discussed

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