THE NEW MOON. G. Arrhenius, Scripps Institution of Oceanography, University of California, San Diego, La Jolla CA 92037-0220, USA (arrhenius@ucsd.edu).

The late heavy bombardment of the Moon extends in time to about 3.8 Ga and continues to about 3.5 Ga with decreasing frequency of recorded impacts on the Moon,. It has been generally assumed that this phenomenon was due to an invasion of the inner solar system by a swarm of asteroidal size objects, that hit the Moon and all of the terrestrial planets with severeness in proportion to their gravitation.

The extension of the record on Earth, and more fragmentarily on Mars, into this time frame, demonstrates a lack of the predicted devastating effects. The sedimentary record on Earth consists of segments of undisturbed laminated banded iron formations, that contain traces of what appears as biochemically evolved microbial life. This record reaches back in time beyond 3.86 Ga . The martian igneous rock record indicates a crystallization age of 4.5 Ga, followed by shock events, but without signs of remelting in late bombardment catastrophes.

These observations suggest, as one possibility, a local source of bodies in lunar orbit, that coalesced with the Moon. Alternatively, solar system wide impacts may have been sufficiently sporadic to have escaped recording in currently studied sedimentary sequences on Earth. The latter alternative would have to be coupled with an assumption of rapid re-colonization of the hydrosphere by life. It would than have arisen anew after each sterilizing impact, or emerged from protected survival niches.

These are speculations about of the absence of a recorded late planetary impact period . Current experiments that aim at resolution of this problem will be discussed.