Early traces of life in the fossil record

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The question of the origins of life has been one of the great questions of all time, at least since the Greek philosophers. Yet it has become a scientific field only relatively recently. Nowadays, it is a truly multidisciplinary field associating physicists, biologists, chemists, geologists and philosophers. While prebiotic chemistry, based on experimental and theoretical studies aims at pinpointing the chemical reactions that allow the very first transitions from inert matter to true living organisms, geologists work on another "stage" of the origins, relying on the study of ancient rocks to track down the oldest occurrences of life on Earth or elsewhere. This is a difficult quest with many pitfalls to discriminate between abiogenic and biogenic traces. It goes through frequent flashbacks and flashforwards to decipher how biological organisms leave directly or indirectly traces in the fossil record, under what forms, and how these can be detected by increasingly sophisticated analytical tools. Here, I will review some of the supposed oldest traces of life in rocks and discuss the bases of these interpretations. I will also mention some of the ongoing approaches developed in the field to better interpret these oldest traces of life in the geological record.