

The transverse valley which descends from Piedras Negras and the village of San Juan, towards Parapara and the Llanos, is filled with trap-rocks, displaying close affinity with the formation of green slates, which they cover. Sometimes we seem to see serpentine, sometimes grünstein, and sometimes dolerite and basalt. The arrangement of these problematical masses is not less extraordinary. Between San Juan, Malpaso, and Piedras Azules, they form strata parallel to each other; and dipping regularly northward at an angle of 40° or 50° , they cover even the green slates in concordant stratification. Lower down, towards Parapara and Ortiz, where the amygdaloids and phonolites are connected with the grünstein, everything assumes a basaltic aspect. Balls of grünstein heaped one upon another, form those rounded cones, which are found so frequently in the Mittelgebirge in Bohemia, near Bilin, the country of phonolites. The following is the result of my partial observations.

The grünstein, which at first alternated with strata of serpentine, or was connected with that rock by insensible transitions, is seen alone, sometimes in strata considerably inclined, and sometimes in balls with concentric strata, imbedded in strata of the same substance. It lies, near Malpaso, on green slates, steatitic, mingled with hornblende, destitute of mica and grains of quartz, dipping, like the grünsteins, 45° toward the north, and directed, like them, 75° north-west.

A great sterility prevails where these green slates predominate, no doubt on account of the magnesia they contain, which (as is proved by the magnesian-limestone of England*) is very hurtful to vegetation. The dip of the green slates continues the same; but by degrees the direction of their strata becomes parallel to the general direction of the primitive rocks of the chain of the coast. At Piedras Azules these slates, mingled with hornblende, cover in concordant stratification a blackish-blue slate, very fissile, and traversed by small veins of quartz. The green slates include some strata of grünstein, and even contain balls of that substance. I nowhere saw the green slates alternate with

* Magnesian limestone is of a straw-yellow colour, and contains madrepores: it lies beneath red marl, or muriatiferous red sandstone.