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Orogenic Gold Mineralization of the Cordillera Real and El Oro Metamorphic Complex, Ecuador

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Ecuador's orogenic gold potential is primarily hosted within two metamorphic complexes: the Cordillera Real and El Oro. Based on evidence from outcrops, river boulders, heavy mineral concentrates, and geochemical data, this mineralization is recognized in four sectors within the Cordillera Real, extending from south to north: San Antonio de Las Aradas-Yangana, Principal-Río Ayllón-Río Collay, Laguna Negra, and Oyacachi-Monte Olivo-La Bonita. These systems are structurally controlled along the major fault boundaries of the Alao, Loja, and Salado lithotectonic terranes, which are composed of metamorphic rocks ranging from greenschist to amphibolite facies. In the El Oro Metamorphic Complex, there is evidence in the Río Naranjo area, associated with the Zanjón-Naranjo shear zone; this structure represents the tectonic boundary between the amphibolites of the Quebrada Plata Unit and the greenschists of the Panupali Unit. Among these occurrences, the Río Ayllón area is the most prominent, where quartz-pyrite-arsenopyrite veins have yielded exceptional high-grade values of up to 635 g/t Au. The origin of this mineralization could be linked to two major tectono-metamorphic events: the Triassic Tres Lagunas-Moromoro and the Upper Jurassic-Lower Cretaceous Peltetec-Palenque. The Mesozoic origin of this gold is supported by stratigraphic evidence from the Eocene Tiyuyacu Formation, which preserves well-rounded pebbles of similar quartz veins and mica schists. This suggests that these orogenic systems had already formed and were undergoing significant erosion and secondary concentration by the early Cenozoic.