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GOLD IS WHERE YOU FIND IT IN LODES AND IN PLACERS TRAINS DOWNSTREAM

Auriferous lode occurrences is the primary geological factor for placer gold. These auriferous areas may occur within the physiohraphic - subdivision of coastal mountains, interior plateau, and eastern mountains. Examples of Goldfields of the coastal mountain are those of California, - the west slope of Ecuador and Chile. Those of the interior plateau type are of Cariboo and Atlin goldfields of British Columbia and many others including those of most of Columbia and Alaska. The goldfields of the - astern mountain, in Peru known as the montaña slope are those of Montana, and the Liard River in North America and those of Peru, Bolivia and - Ecuador. The source of the placer gold most occur in these areas before there is any placer concentration.

GOLD IS RICHER WHERE IT HAS BEEN CONCENTRATED BY RECYCLING

An important factor in the enrichment of placer deposits is tectonism. Uplift of mountain systems promotes erosion on mountain slopes - and the transport of gold in creeks and rivers. Gentle uplift, crustal warping or tilting also promote new cycles of erosion and a gentle reworking and reconcentration of initial placer values in gravels. The first - formed concentration may be preserved in terraces or these terrace gravels may be partly reworked. Possibly several cycles occurred to produce the large rich placer deposits.

In the Klondike Goldfields weathering and erosion during early - Tertiary time lowered the topography of low relief in the interior - regions of the Cordillera. Late Tertiary uplift caused incision of - drainage systems and developments of "V" shaped valleys which upon reaching equilibrium widen their valley floors. Crustal fitting at the end of the Tertiary period caused a disequilibrium causing deposition of - thick alluvion in valleys. As streams adjusted, entrenching the uplifted areas on alluvial terrace and a buried bedrock terrace systems were - elevated. Initial placer gold paystreaks were preserved on the bedrock terrace in places where the entrenching stream was to one side of the valley centre. This paystreak was reworked where the position of the - entrenching stream coincide with the valley centre.

The direction of offset may be climatic, sedimentological or structural. Lower terrace deposits were preserved on downstream sides of spurs.

RICH GOLD DEPOSITS MAY BE HIDDEN OR DISTROYED

Glaciation of Cordillera terrain is a very important factor in placers. When glacial erosion is intense in areas of low topographic relief placer concentration can be completely distroyed. When glacial movement across a region is parallel to master valleys, gravels in those valleys is distroyed as the valley is eroded; tributary valleys on the other hand tend to be filled by glacial till and the placer deposits there are buried and preserved.

If ice flow direction is up a watershed a glacial lake is formed by the ice dam, the eroding effect is reduced by floatation of the ice and the floor of the lake is covered in debris resulting from melting at the ice front. As the glacier advances up this valley the ice front sediment tend to protect the underlying auriferous gravels from erosion. If the ice flow direction is down a watershed erosion by large volumes of meltwater, possibly augmented by drainage from glacial lakes, may disperse placer concentrations. The bulldozing effect of glaciars may account for richer deposits at the end of the interval of glacial erosion.

<u>EVOLUTION OF MINING METHODS FOR PLACER DEPOSITS</u>

Modifications of sluicing systems tends to be cyclic through time but evolve as a mining district develops. The rate at which this change occurs varies with the reserves and or the values in the deposits.

Several economic and technological thresholds exist. The length of the shovel handle commonly limits the depths of pits. The additional cost of improvement of draining by pumps as opposed to bailing by hand is sometimes critical.

Once the initial richer deposits were mined large dredge mining - operations began reworking tailings from open pit and underground placer mines to recover very low grades of auriferous gravels.

When dredge mining had ceased ca. 1965, dredges were abandoned. - The wooden boats quickly succombed to flooding and decay. As the interest in gold again arose some former dredge reserves were mined by bottom - loading duggies and the gravels were washed in sluice boxes.

Initial hydraulic mining which followed early stages of dredging - used gravity water. More recent systems used piped water pumped from the valley bottom.

Sluice boxes evolved from wooden boxes and flumes with various - sorts of riffles, to metal sluice boxes. These consisted of a dumpbox - covered in cocomap below punched iron plate. The lower narrower sluice - trough with cocomap covered by sets of angle iron riffles. The riffles - are compressed of many "rungs" where the vertical upstream segment stops waterflow and the remaining part of the iron trails down stream from the dump box area. These riffles provided maximum retension of the gold - behind the riffle and optimum eddy action for removed of lighter grains. The larger boulders would tend to bounce and rill down the treads of the anglin iron producing a desired vibratory effect. Modern treads are towards a riffleless box with astro turf as a concentrating surface and shingled pieces of punchplate.

Tractor mining in the klondike Goldfields before 1970 were usually small one man operations. The sluice box set up was temporary and the tailings piles small and scattered. Auriferous gravels were pushed to the sluice box by a crawler type of tractor or bulldozer and the tailings were staked and the bedrock drain maintained by the some operator. Later, front end loaders were used to load the sluice box because of the preference of some miners to lift and carry gravels rather than push them and possibly loose values to the gravels traversed by the bulldozers. The hravier bulldozers were considered most suitable by some for tailing - stocking despite high rates of wear because of the sand and water getting into moving parts of the machine. This procedure was reversed by 1980 - when the popular trend was to use rubber tired vehicles where wet tailings are to be stocked and a bulldozer in dry ore.

PLACER GOLD: ITS CHARACTERISTICS AND ENVIRONMENT OF DEPOSITION

The nature of gold varies as it travels down slope from its sources in veins and along floors of streams. Its shape and surface texture is modified by pounding and wear during transport. Physical flattening, breaking and scraping of grains combines with chemical weathering and corrosion produces small gold grains that tend to be carried far down stream. Restoration of damaged surface and reworking of the particles produced by attrition also occurs.

The vertical distribution of gold particles is characterised by high concentrations of coarser gold at the base of the gravels. This is due to the effect of scour. Cyclic erosion and redeposition of sediment resulting from climatic change also plays a role in placer concentrations and in the production of richer gravels at the base of the stratigraphic sections.

The size distribution of the gold grains with distance down the valley usually shows a trend toward concentrations of finer grained gold. This depends on the stream gradient which controls the activity of the stream and on the shape factor which controls the settling rate and the effect of winnowing in floodwaters. The production of fine grained gold with predominantly flat shapes results in bar gold on river gold depotis. Bar gold is deposited as a thin veneer on the crest of upstream portion of the point bar in a meander band. The richer concentration occurs where the surface of the gravel is composed of well sized pebbles and also on such bars covered by short grass on a smooth surface. There, the turbulence that is associated with the rough surface of poorly sorted gravels is at a minimum and the surface is in an equilibrium position.

Some factors which produce richer concentrations at the base of the gravels depend on the character of the bedrock and also on the size of the boulders in the gravels. Alternating bands of hard and soft rock such as interbedded quartzite and slate tend to act as a natural bedrock riffle system with the gold being retained in crevases. Blocky or fractured bedrock such as quartzite or fault breccia also tend to act as a natural block-riffle system. Potholes or natural stone mills tend to act as traps, however gold is soft and tends to be ground into dust unlike the very hard, durable diamonds in diamondiferous placers.

The finely divided gold can easily be removed from such structure by winnowing.

Very large boulders which tend to reach the river as rock slides - or as talus tend to collect on bedrock as a lag deposit resulting from undercutting of gravel during periods of scour. These blocks tend to protect placer gold concentrations in matrix gravels surrounding them. - In a similar way gravels resting on and pressed into clay layers within - gravels tend to resist erosion and retain placer concentrations on the impermeable, cohesive clay surface. Such clay seams and coarse boulder horizons within the gravel section are noted for higher gold values not at the bedrock surface.

SOME TESTING METHODS FOR PLACER DEPOSITS

The gold pan, battel or batea is the most useful tool for testing surface gravels on a small scale. Testing at shallow depth above water table can be done by sampling in pits. Deeper testing involving drills is costly for small miners and is very difficult to evaluate. Classic methods of banka drills and churn drill are being replaced by reverse - circulation drilling with air or water return and by vibrating drills - which drill dry and provide an in-situ core of the gravels.

Bulk testing to evaluate the recovery achieved for ground evaluated by drilling is done to determine the R/E factor. This varies with - such factors as the grain size of the gold, the quality of panning done during the drilling stage, and the efficiency of the recovery method - used in the bulk sampling.

Pilot plant mining is costly but can be productive. The risk of mining without testing is commonly taken by the small miners who cannot afford the expenses of testing and who will recover at least part of his mining expenses from production from the experiment. Real trends in grade can become apparent from this type of test mining if careful records are kept.