



FIGURE 2.21. Distribution of the PGM in the deposits of China, Colombia, and the world's major deposits (based on in-situ tonnages)

subsidiary, Compania Minera Choco Pacifico SA. In 1916 the payable reserves were stated to be 52 million m³ of ore, and less payable resources of 257 million m³. However, present resources are about 155 500 kg (5 million oz) of PGE, and dredging capacity is said to be 12 Mt of ore annually. Production rose from 373 kg (12 000 oz) in 1982 to 964 kg (31 000 oz) in 1989.

Figure 2.21 compares the distribution of the PGM in the deposits of China, Colombia, and the rest of the world.

South Africa

The existence of the PGE in the gold-bearing conglomerates of the Main Reef of the Witwatersrand fossil placer (2800 to 2500 M/y), were discovered by William Bettel in 1892. The rocks of the Witwatersrand basin are dominantly clastic rocks with interbedded lavas, subdivided into an essentially argillaceous lower part (West Rand Group) and an essentially arenaceous upper part (Central Rand Group) containing the main payable gold- and uranium-bearing conglomerates that are activity exploited. The main PGE-bearing conglomerates are the Main Reef Leader (MRL) on the Far East Rand; the MRL, Main, and South reefs on the Central Rand; and the Kimberley or Battery, Main, and South reefs on the West Rand. The derived placers are the Ventersdorp Contact Reef at the base of the essentially volcanic Ventersdorp Group (2500 to 2400 My) and the Black Reef of the Transvaal sequence (2400 to 2300 My). The ages provided are very rough approximations. The concentration of the PGE (mainly osmiridium) in the Witwatersrand conglomerates is very low, between 0.004 and 0.03 g/t, and recovery is a mere 50 per cent, although Cousins (1976) quotes grades of 0.8 to 212 ppb (µg/t). Newman (1973) estimates an average yearly production of 155 kg (5000 oz), made up of 12 per cent platinum, a trace of palladium, 14 per cent ruthenium, 1 per cent rhodium, 35 per cent iridium, and 38 per cent osmium, but Cousins (1976) quotes average grades as follows (range shown in parentheses):

Pt	11.6 per cent (5.7–22.8 per cent)
Pd	zero
Ru	14.3 per cent (10.6–19.5 per cent)
Rh	0.9 per cent (0.6–1.0 per cent)
Ir	34.9 per cent (28.5–40.8 per cent)
Os	38.3 per cent (28.2–43.3 per cent)

Ethiopia

Platinum was first discovered in 1925 in the extreme western Wollega and Beni Shangul provinces near the Egyptian border, in the areas drained by the Blue and White Nile. The source rocks are Ural-type dunite cores, sequentially surrounded by concentrically disposed pyroxenites and gabbros. The dunite is covered by a siliceous honey-coloured laterite called birbirite (80 per cent silica, 9 per cent iron oxides, 1 per cent chromic oxide), which carries platinum nuggets that have been exploited. In addition, rich but thin placer gravels occur near Yabdo on the Birbir river and its tributaries (Baro, Sobat, Alte, and Kobe rivers) over an area of about

26 km². The deposits were prospected and worked by French, German, and British companies in the past. The reserves are believed to be considerable, and the composition and production of the PGE are provided in the Tables 2.25 and 2.26.

Australia and Tasmania

Platinum was discovered in placers of the Fifield district in 1887 (source unknown, probably hornblende dykes). Production came from the Platina, North 'lead', and Gillenbine tank deposits, but showings also occur in Queensland and Victoria. The main production came from residual deposits on serpentinite source rocks, alluvial concentrations, and fossil placers, which occur over a wide area in Tasmania. The deposits are grouped as follows: Western group (Heazelwood area near the Bald Hill serpentinite, Long Plain, Savage, Wilson, Renison Bell, Dundas, Badger Plain, Whyte, Mount Stewart and the Warner, Nineteen Mile, Jones, and Burgess creeks deposits), the southern group (Gordon, Styx, Florentine, Spero, Birch's inlet, Boyes, and Hamilton Range deposits), southwest Adamsfield group (Adam river, Main, Lavelle, Miller, Williams and Sawback creeks deposits). Their available details are provided in Tables 2.25 and 2.26.

The USA

The USA has always been a small producer of primary platinum, apart from that recovered from gold and copper refineries. The primary source is either alluvial river or beach placers, the earliest production being from California, and later Oregon, Washington, Wyoming, Nevada, and Utah. The main production, however, came from placer deposits in the Goodnews Bay district south of the mouth of the Kuskowin river in Alaska, which was discovered in 1928. Dredging and dragline scraper work centred chiefly on streams tributary to the Salmon Creek (Clara, Squirrel, Fox, and Platinum creeks) heading for the Red and Susie mountains south of Goodnews Bay, but many other noteworthy localities have reported PGE, such as Dime Creek in the Koyuk District of Steward Peninsula; Quartz Creek and Kiwalik River in the Fairhaven district; the Christochina district of the Copper River area; Metal Creek, Kenai District; beach placers on Kodiak Island; Kahiltna River and tributaries, Yentna District; Boob Creek, Innoko District, Granite Creek in the Ruby District; streams in the Marshall District; and beach sands in Lituya Bay of southeastern Alaska. According to Mertie (1969), the main production was by the Goodnews Bay Mining Co., and production from 1927 to 1969 was said to be more than 15 500 kg (500 000 oz). The weighted mean percentages of metals mined between 1936 and 1970 are as follows: platinum 84.05 per cent, palladium 0.39 per cent, ruthenium 0.17 per cent, rhodium 1.32 per cent, iridium 11.52 per cent, and osmium 2.55 per cent. An estimated 30.58 million m³ of gravels remain unexploited in the Salmon and Western creeks.

Canada

Detailed studies of the Canadian placers have been