South America: Colombia

The Western and the Eastern Emerald Zones of the Eastern Cordillera: Still Number 1 in the World

Dietmar Schwarz and Gaston Giuliani report on the most important emerald deposits the world

South America is the world's most emerald-rich continent. Colombia alone produces about 60 percent of the emeralds on the world market while Brazil's 1999 production was worth some 50 million US dollars. While there have always been rumors about new emerald finds in Peru, Mexico, Bolivia or Ecuador, it the quantity and quality of the emeralds of Colombia and Brazil that make South America the world emerald leader.

Age-Old Adornment

37.08 ct pre-Columbian emerald bead. Ronald Ringsrud collection; Jeff Scovil photo

Right: A transparent crystal (2.2 cm high) and a cut stone (1.66 ct.). Colombian emeralds are among the most beautiful on earth. Harold & Erica van Pelt photo

Colombia: Nearly 200 Localities!

There are nearly 200 known emerald localities between 4-6° north and 73-74° west in the Eastern Cordillera. The emerald districts stretch NNE to SSW across two zones of mineralization:

- The **western** zone or **Vasquez-Yacopí** mining district encompasses the **Yacopí** (La Glorieta), **Muzo**, **Maripi** (La Pita, Polveros), **Coscuez** and **Penãs Blancas** deposits;
- The **eastern** zone or **Guavió-Guatéque** mining district includes the **Chivor** (formerly Somondoco), **Gachalá** and **Macanal** deposits.

The locals knew of practically all of the deposits before the 16th century Spanish conquest. Two recently developed mining areas, **La Pita** and **Polveros,** lie between the Muzo and Coscuez Mines in the Maripi mining district along the Rio Minero. La Pita is thought to be one of the largest deposits in Colombian emerald history. The emeralds of the Eastern Cordillera are extremely difficult to mine, and are found in narrow veins and breccias in zones where tectonic deformation occurred. These zones can rarely be followed over any distance, and there are pronounced variations in emerald concentration and quality throughout the deposits; furthermore, many veins in emerald-bearing areas do not contain emeralds. It is often impossible for geologists, even after many years of research, to accurately predict the spatial expanse and profitability of these vein systems; thus mining can be performed in one of two ways:

- Following the emerald-bearing joints literally centimeter by centimeter;
- Mining the entire emerald-bearing rock units; thus processing large rock masses.

Pre-Columbian miners dug shafts and tunnels try-

ing to follow the emerald-bearing veins, and this has remained the major mining method in the Eastern Cordillera for many centuries.

A Difficult Road for the Conquerors

Long before the Spanish conquistadors arrived in the 16th century, the native peoples mined emeralds. This gemstone was held in high esteem in the new world much as it was in the old. Colombian emeralds were traded to the Mayas, Incas and Aztecs who used them for jewelry and ritual. In the middle of the 16th century, the Spanish began to force their way into the mines of the Eastern Cordillera. On March 12, 1537, Capitán Valenzuela held in his hands the first emerald of the Somondoco (now Chivor) deposit. At that time, the entire western mining area was inhabited by the dreaded Muzos and Colimas; the Muisca, known by the Spaniards as *Chibchas*, inhabited the eastern region. The Spanish endured heavy losses as they fought for control of the emerald regions, finally breaking into the territory in 1539. The subjugation of the Muzos, however, took another two decades of heavy fighting. The Spanish finally defeated the Muzos in 1559/60, founded the town of Santísima Trinidad de los Muzos and focused on their quest for emeralds.

Local Indians led the way to the *tap-y-acar*, or green stones, and in 1564 following numerous insignificant finds, the Spanish located the major deposits. Three years later, a mining company was founded to mine Somondoco. The natives were forced laborers, and hostilities with the Indians as well as a labor shortage led to a temporary mine closure toward the end of the 16th century.

The Spanish thirst for emeralds and wealth was insatiable. In 1650, not satisfied with the production at either Muzo or the neighboring Somondoco, the Spanish crown took over the operation of the mines. In 1675 Somondoco was permanently closed. The jungle quickly overgrew the quarries, and the mine vanished. The Spanish monarchy controlled the remaining mines in spite of temporary closures until at least 1792. By that time, mining operations at Coscuez had also been abandoned following a mining disaster that left 300 miners buried in a tunnel. Coscuez disappeared, not to be rediscovered until the mid-1800's.

La Pita Mine *(left): a 2.5 cm high emerald crystal on calcite from the La Pita Mine in the Maripi district. Sandor Fuss Collection; Jeff Scovil photo*

Chivor Mine *(right): underground in the Chivor Mine: a view of an emerald-bearing calcite vein. Dietmar Schwarz photo*

The Green Way into Modern Times

Until 1848 insignificant quantities of emerald were mined in Colombia, and in the middle to late 19th century, anarchy reigned at the unregulated mines. In 1889 the government of Jose Hilario López and the Colombian Congress freed the slaves and nationalized most of Colombia's subsoil. In some

Emerald Gastropod Shells

Found only in the Matecaña Mine (Gachalá district), gastropod shells fossilized by emerald are unique and rare in the fossil kingdom. Microcrystalline emerald has completely replaced the calcareous shell.

135 million years ago, an inland sea engulfed what are now the emerald districts of Colombia. Sedimentary layers of black shale formed that included fossils. 65 million years ago, emerald mineralization replaced the calcitic shells of gastropods located in a black shale horizon.
Collection Ronald Ringsrud; photo Harold & Erica van Pelt

cases, including the area of the still-lost Somondoco Mine, perpetual property taxes were paid in exchange for subsoil rights. In 1905, the government declared itself owner of all mines. Licenses were individually distributed with various terms and conditions, and some mines were operated by the government. Parts of the Coscuez Mine were also reactivated.

It was during this time that Hernan Restrepo rediscovered the Somondoco Mine, re-baptizing it with the age-old Muisca Indian name *Chivor*. As the government did not own the subsoil rights for this area, Chivor became the only privately held emerald mine in Colombian history. Fritz Klein, of Idar-Oberstein, coordinated the development of the Chivor deposit, and in 1920, Klein found one of Colombia's largest emeralds: *Patrizius* (see facing page). The Patrizius emerald is presently housed and exhibited at the American Museum of Natural History in New York.

In 1946 the government appointed *Banco de la República* to be administrators of the mining districts of Muzo, Coscuez and some of the smaller deposits. *Banco de la República* was also responsible for emerald cutting and marketing.

From 1968 to 1973, *Empresa Colombiana de Minas* (ECOMINAS), a newly formed government-owned company, took control of and was responsible for emerald mining and production. Government control of the lucrative deposits proved impossible without significant military support, and in 1977 the former licensed claim structure was reinstated. Taxes, or more correctly rent, on the emerald claims was based not on production, but on the size of an individual claim. This structure created a situation in which claim owners were forced to high-grade their deposits in order to meet their financial obligations. High-grading employs more dynamite and results in more damage to emerald and other mineral specimens in the name of maximizing the production of rough. In 1996 ECOMINAS ceased operations and was replaced by the state owned *Minerales de Colombia* (MINERALCO).

In the middle of the 1990's, Colombian emerald production fell sharply. There are diverse reasons for this decline, not least among them:

- stagnant sources: since the Spanish conquest, there have been only a few insignificant new deposits discovered;
- antiquated mining methods in dangerous environs: implementation of modern mining techniques require the importation of technical expertise and financial investment from foreigners;
- wary public: the increased use, since the mid-1990's, of techniques to improve emerald transparency (see page 79) has negatively impacted the reputation of and thus the demand for emeralds, Colombian emeralds in particular;
- oversupply: decreased market demand lead to bulging emerald supply, and production was intentionally reduced to prevent a further plunge in prices.

Big Companies and Guaqueiros

Where heavy machinery was available, extensive quarries developed, and enormous quantities of rock were moved. These quarries, however, had a noticeable impact on the previously virgin ecology.

Emeralds from Chivor

Upper left: The famous emerald found in Chivor by prospector Fritz Klein of Idar-Oberstein. He named the 650-carat stone "Patrizius," after the patron saint of Ireland. This drawing is from Fritz Klein's book Smaragde unter dem Urwald - Meine Entdeckungs- und Erlebnisreisen in Lateinamerika (Berlin, 1941).

Upper right

La Paz Beauty

A 3.5 cm crystal in calcite next to an emerald cut from rough from the same locality. Marcus Budil collection; photo Jeff Scovil

Right

Muzo Emerald

a "dream" specimen of emerald crystals radiating from an 8.5 cm wide calcite matrix. Jeff Scovil photo

Colombian Classic

Emerald on calcite from the Western mining district in Boyacá; height 5.9 cm.
Collection Rex Harris, photo Jeff Scovil

World Famous: Muzo Mine

Emerald and quartz from the Muzo Mine; height 4 cm.
Photo Harold & Erica van Pelt

Coscuez Mine

a 1998 photo by Dietmar Schwarz of El Reten hill. The quarry is in the black shales that are capped by brown limestones.

Environmental damage was becoming a serious issue, and the government was forced to intervene. The government's attempt to control the burgeoning environmental problems, coupled with the mine owners' recognition that operating modern underground mines are more profitable than open pits, provided the impetus necessary for nearly all of the larger mines to restructure their operations in the beginning of the 1980's. Nowadays, important deposits like Muzo, Coscuez and Chivor are operated by large companies. TECMINAS, COEXMINAS, ESMERACOL and SOCIEDAD ESMERALDY own the claims and mine the significant deposits.

Miners' cooperatives are relatively new to Colombia; still, some miners are forming associations and working the smaller deposits. Traditionally, guaqueiros, a motley group of adventurers and outlaws, live near the mines with their families and process the dumps. The tradition of these independent miners continues today.

To protect the licensed areas from uninvited guests, the companies employ well-armed security services. Weapons are worn with pride, and if unofficial statistics have merit, are often used.

La Pita - Rising Star

Muzo and Chivor are surely the most famous and most heavily steeped in tradition of the Colombian emerald mines. From an economic point of view, however, Coscuez is the only mine that has produced continuously since the 1990's. In 2000 Coscuez, run by ESMERACOL, had five 100 meter shafts, twenty-five tunnels and sixty actively working pockets. In the area surrounding the mine, there were some 3,000 miners employed and 10,000 guaqueiros in residence.

It is estimated that, until recently, roughly 75 percent of Colombian emeralds were produced by Coscuez. Today La Pita is responsible for at least 65 percent of Colombia's emerald production with Coscuez, Muzo and Chivor providing the remaining 35 percent (*AFG Journal*, 2001). In an effort to raise the falling market prices of emerald, much of the production at La Pita has been stored and mining has slowed. Limiting production at La Pita has enabled the development of new tunnels in the same deposit such as Polveros, Casa de Lata, Las Cunas, Chizo and Los Totumos. La Pita is mined by a consortium of the companies SANTA ROSA LTDA and PROMINAS DAL ZULIA LTDA. This mine, at

its peak, reached a production level of 28,000 carats of emerald per day.

In an effort to restructure Colombia's emerald industry, joint ventures between the public and private sectors have explored a 3,000 km^2 area around Chivor in hopes of finding new deposits.

Minerals of the Emerald District

Colombian emeralds are found primarily in carbonate veins along with pyrite and albite. In the western emerald zone, veins and joints are filled predominantly with calcite, dolomite, oligoclase-albite, muscovite and pyrite. The types and quantities of associated minerals, however, vary widely. At the Tequendama Quarry in Muzo, calcite, dolomite, albite, quartz, pyrite, bitumen and fluorite are reported. In addition, Muzo yields wonderful parisite crystals, possibly among the world's largest and best. Apatite, muscovite and tourmaline are rarely found. In the Coscuez Mine(s), pyrite, quartz, dolomite and parisite are often reported but fluorite, apatite, albite and barite are rare. The anomalous trapiche emeralds occur only in the western emerald zone.

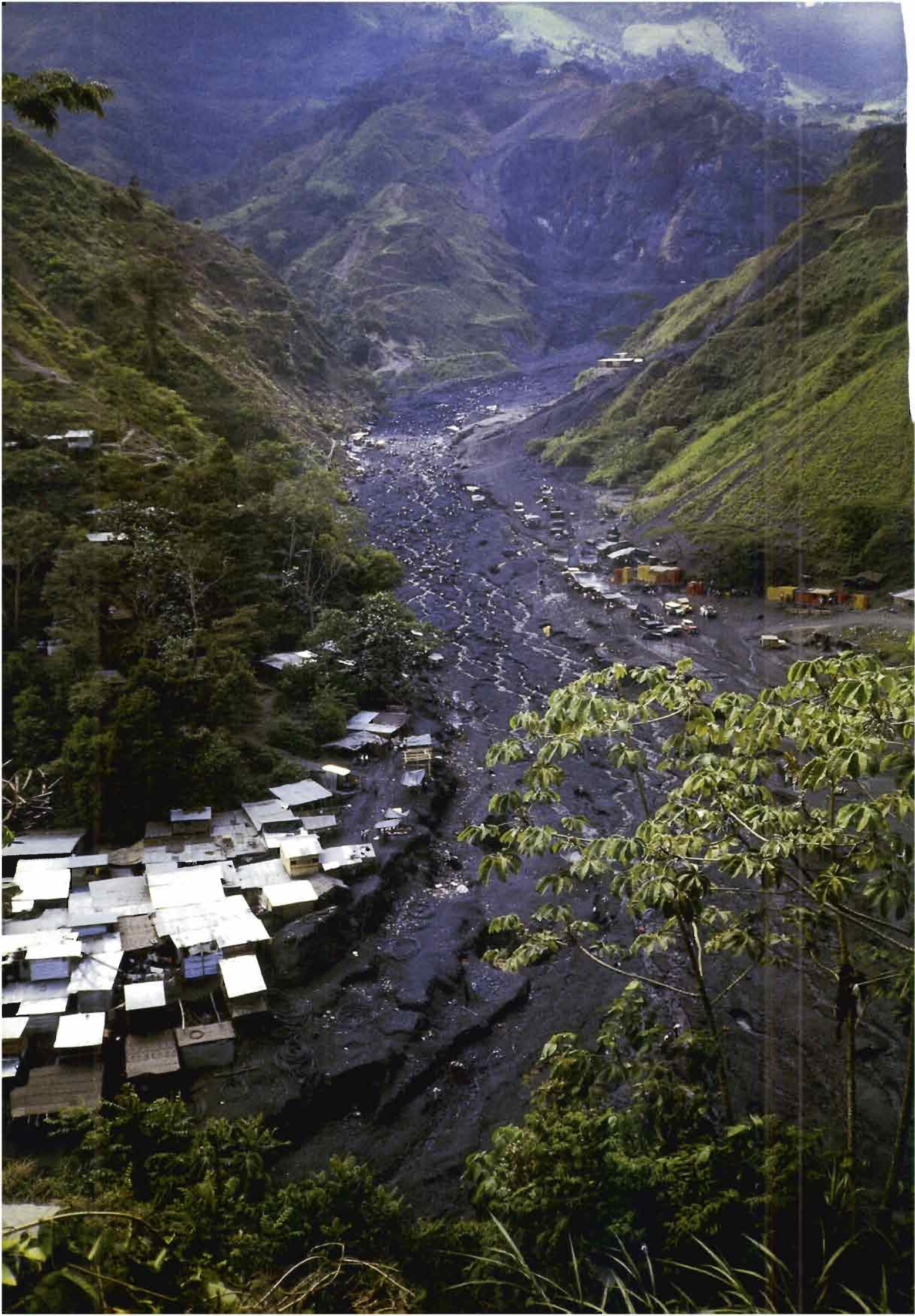
Chivor's shales and limestones are crosscut by a variety of vein types. Commonly, the veins are composed of pyrite and albite with minor occurrences of quartz, dolomite and muscovite. Hematite and goethite/limonite are further associated minerals. Fantastic small to quite large crystals of euclase ranging from pale to intense blue have been found in both the Chivor and Gachalá Mines. Chivor's emeralds are occasionally associated with kaolinite, sericite, halloysite, allophane, limonite, muscovite, hyalite and dense masses of quartz. The clay minerals are products of weathered feldspar; the goethite and limonite are products of weathered pyrite.

Knowledge of the minerals associated with emerald can be useful to collectors in identifying and authenticating specimens. This knowledge, however, is not easy to acquire. The mines are in the business of producing rough; thus, emerald specimens are rarities and non-emerald mineral specimens are food for the crusher. This is a shame, for Colombian deposits deliver not only exceptional rough, but also some of the most aesthetic collector's specimens in the world.

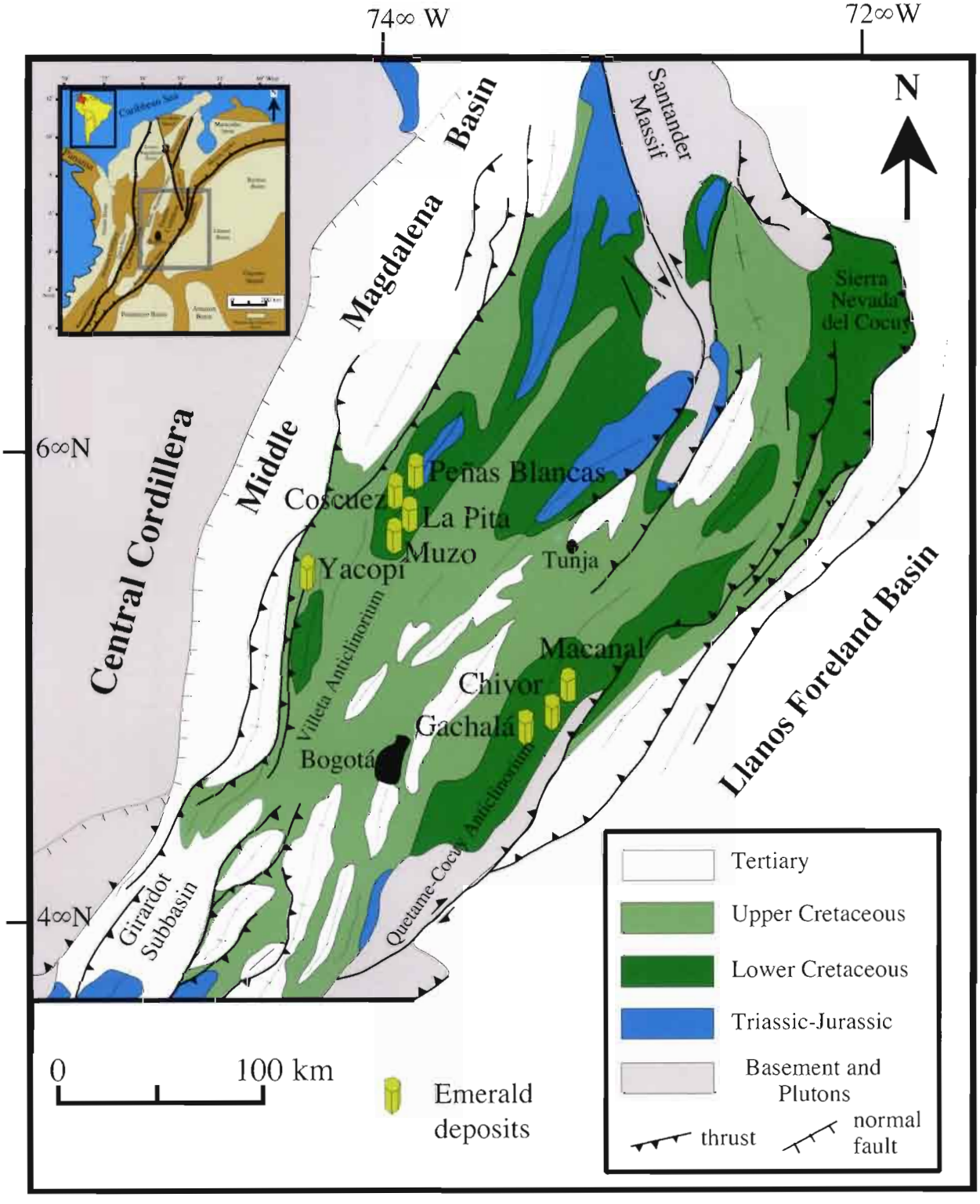
Specimens from Coscuez

Upper: A 2.5 cm emerald on black calcite; Specimen Collector's Edge

Lower: A 5 cm emerald specimen on a carbonate matrix. Steve Smale collection; both photos Jeff Scovil



Colombian Emerald Deposits



The principal geologic units of Colombia and the distribution of the Colombian emerald deposits (Branquet et al, 1999)

Left: An aerial view of the black shale sediments and the huts of the guaqueiros near the Muzo Mine in 1998; Dietmar Schwarz photo

Schwarz D., Giuliani Gaston.

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