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Special Publication Number 23 

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38 Hydrothermal Gold Deposition in Epithermal, Carlin, and Orogenic Deposits
Discovery is the source of real value creation in the gold mining industry, which makes exploration our equivalent of a pharmaceutical company’s research and development department: the foundation of the business as well as the driver of its growth.

The 100th anniversary of the SEG is an opportune occasion to highlight the critical role of geology in the complexity of modern mining, both as an essential pioneering endeavor and as the provider of the research, analysis, and modeling that will determine the viability of a new discovery and then point the way for its optimal development. At a time when greenfields discoveries are becoming scarcer, it plays an equally important part in extending known asset bases.

For Barrick and for me as a geologist, it is a great pleasure to sponsor this landmark volume, thereby continuing our long association with exploration’s foremost professional organization. Barrick and our legacy company, Randgold, have a long history of exploration success—we contributed to seven of the 29 deposit descriptions featured in these pages—while I have always been committed to putting the geosciences at the core of our operations.

This special volume gives geology its deserved due and provides a timely insight into the world’s major gold deposits and provinces. It will be a highly valuable, long-lasting reference for all geoscience practitioners of this and future generations.

I would like to express my appreciation to the editors, Richard H. Sillitoe, Richard J. Goldfarb, François Robert, and Stuart F. Simmons, and to thank the authors for their contributions, along with Brian G. Hoal, Alice Bouley, and Mabel Peterson of the Society of Economic Geologists. In conclusion, I also want to pay tribute to the men and women who walk the hills in search of their next discovery.
Geology of the World’s Major Gold Deposits and Provinces: Preface

For economic geologists, be they from academia or industry, gold is an important and fascinating commodity that demands a great deal of their collective research and exploration attention. The metal accounts for roughly half of the world’s nonferrous exploration activity, which equates to corporate expenditure on the order of US$5 billion annually. Although present-day research and exploration employ a myriad of specialized tools and techniques, the basic geologic features of gold deposits—lithologic and structural controls, alteration zoning, lithogeochemistry, and mineralogy—provide the foundation stones for both laboratory studies of and search for gold deposits, and will undoubtedly continue to do so.

It is for this reason that successive SEG Publications Board chairs, Stuart Simmons and Rich Goldfarb, promoted the idea of a volume focused on basic geologic descriptions of the world’s major gold deposits and provinces as an ideal contribution to the Society’s 100th anniversary celebrations. Selection of the deposits and provinces for inclusion in the volume—SEG Special Publication 23—was no easy task, but total gold content and high average gold tenor were the most influential parameters. Although a number of abandoned deposits, including Homestake in the United States, Kolar in India, and Morro Velho in Brazil, are historically important, it was decided to focus on currently or soon-to-be producing mines and provinces. Some of these (Cripple Creek, Kalgoorlie, Obuasi, Timmins, Witwatersrand) have long and illustrious histories whereas others, including all the low-grade deposits, entered production in the last few decades. Indeed, Fruta del Norte came on stream since the paper was written and Sukhoi Log, although long known, is still at the feasibility stage. Orogenic gold deposits and provinces dominate the volume’s content, in keeping with their preeminence for global gold endowment. Nonetheless, the geology of the world’s largest gold concentration, the Witwatersrand goldfields of South Africa, also features prominently. Indeed, it could be perceived that epithermal and porphyry deposits are somewhat under-represented, given their worldwide abundance, the reason being the relatively small size and low grade, respectively, of many of them.

The volume is introduced with a series of thumbnail sketches that attempt to give a general flavor of the principal currently recognized gold deposit types, several of them insufficiently important globally to merit representation, and concludes with a consideration of gold transport mechanisms relevant to the major deposit types. The meat of the volume, however, is in the 29 deposit descriptions and seven province overviews. Each description summarizes exploration history and regional and local geologic settings preparatory to synthesizing the salient lithologic, structural, alteration, and mineralization features of the deposit itself. The province papers address terrane-scale geologic parameters and their controls on the localization, styles, and timing of gold mineralization.

As editors of the volume, we have enjoyed the disparate challenges presented over the past three years and would like to express our appreciation to the authors of the papers—compliant and recalcitrant alike—for their contributions, many prepared during serious competition with corporate duties. We are also indebted to the 63 specialists, listed below, who peer reviewed the manuscripts in timely fashion, to Alice Bouley, Managing Editor of SEG publications, for overseeing production of the volume, to Mabel Peterson, for careful copyediting, and to Laura Doll and Vivian Smallwood, for meticulous handling of layout. Last but not least, the Society offers its sincere thanks to Barrick Gold Corporation for generous sponsorship of the volume.

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