



The Bepkong gold deposit, Northwestern Ghana



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ARTICLE INFO

Article history:

Received 9 April 2015

Received in revised form 25 June 2015

Accepted 29 June 2015

Available online 2 July 2015

Keywords:

Bepkong deposit
Northwestern Ghana
Gold mineralization

ABSTRACT

The Bepkong gold deposit is located in the Wa–Lawra belt of the Paleoproterozoic Baoulé-Mossi domain of the West African Craton, in NW Ghana. It occurs in pelitic and volcano-sedimentary rocks, metamorphosed to greenschist facies, in genetic association with zones of shear interpreted to form during the regional D₃ deformational event, denominated D_{B1} at the deposit scale. The ore zone forms a corridor-like body composed of multiple quartz ± carbonate veins surrounded by an alteration envelope, characterized by the presence of chlorite, calcite, sericite, quartz and disseminated pyrite, arsenopyrite plus subordinate pyrrhotite and chalcopryrite. The veins contain only small proportions of pyrite, whereas most of the sulphides, particularly arsenopyrite, occur in the altered host rock, next to the veins. Pyrite is also common outside of the ore zone. Gold is found in arsenopyrite, where it occurs as invisible gold and as visible – albeit micron-size – grains in its rims, and as free gold within fractures cross-cutting this sulphide. More rarely, free gold also occurs in the veins, in fractured quartz. In the ore zone, pyrite forms euhedral crystals surrounding arsenopyrite, but does not contain gold, suggesting that it formed at a late stage, from a gold-free hydrothermal fluid.

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1. Introduction and exploration history

In recent years, renewed attention has been paid to the mining potential of the Paleoproterozoic greenstone belts of the West African Craton (WAC). This part of Africa is well known for its world-class mineralization, mostly in the Ashanti Belt of Southern Ghana, which is host to giant gold deposits such as Obuasi, Damang and Wassa. While these deposits have been relatively well studied (e.g., Fougereuse et al., in press; White et al., 2015; Perrouty et al., 2015, and references therein), much less has been published on other regions of the WAC. This and other contributions in this special issue are an effort to fill this gap, by providing comprehensive geological information on a number of poorly known mineralizations, such as those in the northwest of Ghana (e.g., Salvi et al., 2016–in this issue).

Reports on gold mining in Northwestern Ghana date back to the early 1960s, when the Gold Coast geological survey reported numerous gold occurrences during their geological field mapping in the area. Further discoveries of gold in bedrock were reported roughly in the same period by a Russian geological team who carried out geological mapping and prospecting in the area, and outlined prospects in the Wa–Lawra

greenstone belt (Griffis et al., 2002). These reports mentioned occurrences of gold related to quartz veins near the Wa Township, and narrow, discontinuous north–south trending quartz veins near the villages of Duri and Lambussie.

The first methodical exploration on the Wa–Lawra belt was undertaken by BHP-Utah Minerals in the early 1990s. They completed a regional bulk leach extractable gold (BLEG) soil survey of the entire Wa–Lawra belt along a 2 km traverse, with a sampling spacing of 200 m. This exercise defined various prospects along the Wa–Lawra belt, including the Kunche, Duri, Basabli, Atikpi and Yagha deposits. In the late 1990s, these prospects were tested by various geochemical approaches (stream sediments, soils, laterite and anthill sampling) at a local scale, and the geology was mapped, by AGEM (a joint venture between Ashanti Goldfields and IAMGOLD of Canada) who held prospecting rights during that period. AGEM refined the various anomalies by undertaking further trenching, rotary air blast (RAB) programmes and minimum reverse circulation (RC) drilling programmes (about 8 holes) and identified the Kunche–Atikpi shear zone, a 40-km long mineralized structure parallel to the main Jirapa fault, in which the Bepkong deposit is situated. Despite intercepting mineralization (eg. for borehole NRC023, AGEM had 2 m at 1.2 g/t from 47 to 49 m and 13 m at 1.33 g/t from 54 m to 66 m), the company farmed out the tenements to Semafo in 1999. The latter did little work,

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Table 1
General information on the Bepkong deposit.

Deposit name	Bepkong
Commodity of exploitation	Au
Location	NW Ghana
Longitude–latitude [dec. degrees]	10°25'N–2°45'W
Geographic location	The deposit is situated 50 km NNW of the regional capital (Wa) of the Upper West region in NW, Ghana.
Geological location	West African Craton; Leo-Man shield; Baoulé–Mossi domain; Wa–Lawra belt
Deposit status	Prospect under development (mine development stage)
Deposit type	Sediment hosted; sheared zone hosted, quartz veins
Current owner	Azumah Resources Limited
Average grade	1.84 g/t
Tonnage	1.9 Mt of measured and indicated resource; 113,000 oz proven reserves (September, 2014)
Past production	No production to date

except outlining few low-level geochemical anomalies within the Kunche–Atikpi shear zone. Semafo allowed the tenements in the area to lapse that year.

On the 2nd of March 2005 the tenements were granted to Carlie Mining Cooperation and were immediately transferred to Azumah Resources Limited, on the 5th of March 2005. From 2005 to 2007, Azumah Resources focussed its exploration on target generation, which included various multimedia geochemical sampling (soil, auger, rock sampling and occasionally stream sediments) in the deposit area. These studies defined various low-level gold anomalies. One auger hole returned a value of 1300 ppb and that lead to the discovery of the Bepkong deposit. This target was further tested for bedrock mineralization from 2007 to 2012 with air core (AC), reverse circulation (RC) and diamond drilling (DD) methods (Azumah Resources Limited, 2012a). From 2012 to 2014, Azumah Resources Limited has defined both measured and indicated resources of 1.9 Mt proven reserves of 113,000 oz in the Bepkong deposit (Azumah Resources Limited, 2012b). At present, the deposit is at an advanced-exploration to near-mining stage (Table 1).

2. Regional geological overview

The Bepkong gold deposit is located in the Wa–Lawra greenstone belt in Northwestern Ghana, and is part of the Paleoproterozoic Birimian terranes of the WAC (Fig. 1). This belt is the only N–S trending belt in Ghana (Kesse, 1985; Samokhin and Lashmanov, 1991; Pobedash, 1991; Roudakov, 1991), whereas all other belts trend NE–SW (Griffis

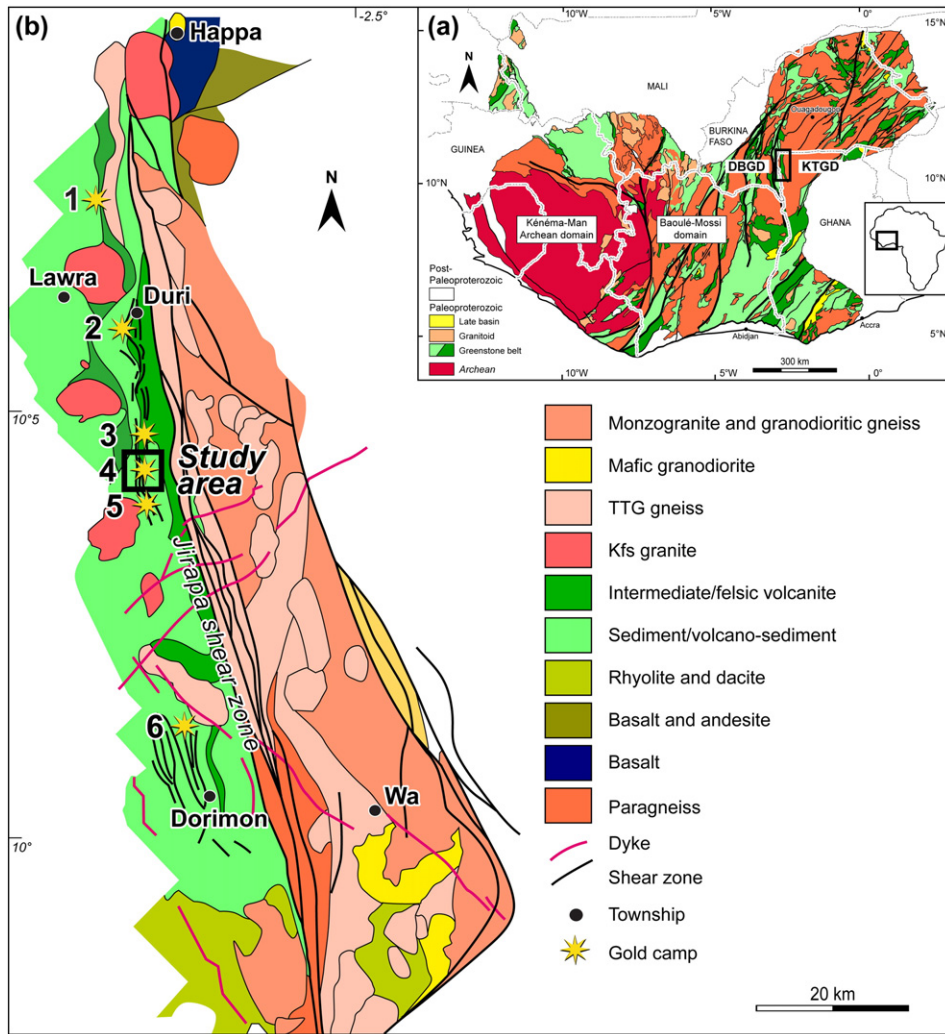


Fig. 1. a) A geological map of the West African Craton (WAC) showing the main lithostratigraphic terrains: the Kenema-Man domain, the Baoulé-Mossi domain, the Koudougou–Tumu granitoid domain (KTGD), and the Dieboukou–Bouna granitoid domain (DBGD). The position of the Wa–Lawra belt (Fig. 1b) is located by the black box. b) Detailed geological map of the Wa–Lawra belt (modified after Block et al., 2015) showing its various gold camps on the Kunche–Atikpi shear zone (see Fig. 2), west of the Jirapa shear zone: 1. Basabli, 2. Duri, 3. Yagha, 4. Bepkong, 5. Kunche and 6. Butele. The study area, located, is shown in detail in Fig. 2.

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