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Progressive Shearing and Its Control on the Cavanacaw Gold Vein Deposit, Northern Ireland: Interpreting a Complex Vein System and Implications for Regional Metallogeny

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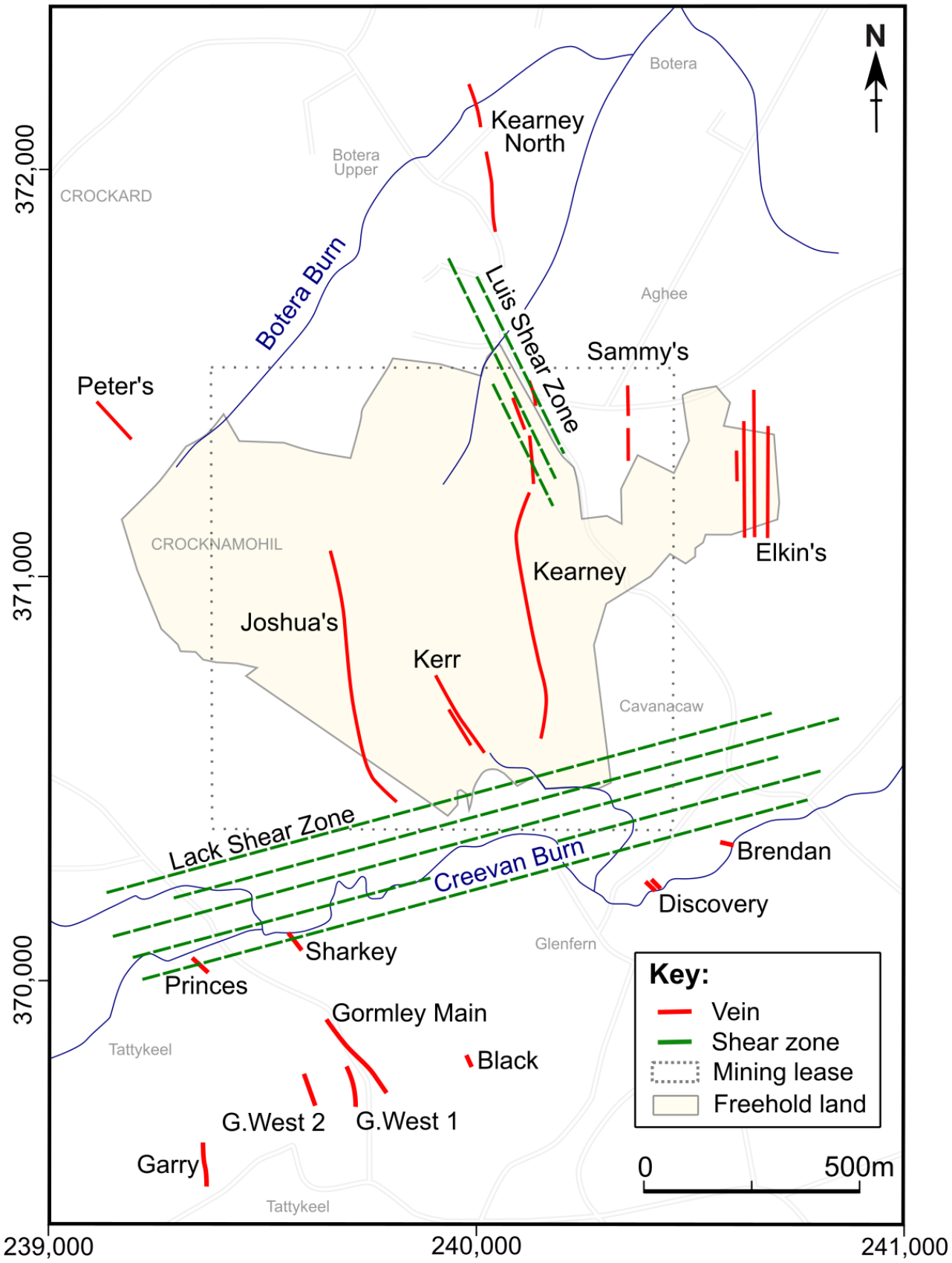
Gold-quartz vein systems that propagate within progressive shear zones can exhibit complex geometric and kinematic frameworks. This can easily lead to the development of overcomplicated structural models and/or misinterpretations regarding when these vein deposits formed in respect to the tectonic and metallogenic evolution of an area. In this presentation, we present a case study where this has been the case: the Cavanacaw gold-silver-lead vein deposit (~0.5 Moz Au) in Northern Ireland (Fig. 1) (Galantas Gold Corp, 2014). Past studies have interpreted Cavanacaw to have had a long-lived geologic history: the broadly N-S-striking sinistral vein system is inferred to have initiated during Grampian compression (ca. 470-465 Ma) and to have mineralised though the injection of several fluid pulses during the Palaeozoic (Siluro-Devonian and Carboniferous) (Cliff and Wolfenden, 1989; Earls et al., 1996; Parnell et al., 2000). These studies further document broad similarities in paragenesis and fluid chemistry to infer a temporal link between Cavanacaw and the nearby Curraghinalt deposit (>6 Moz Au) that is located ca. 27 km to the NE (Dalradian Resources Inc., 2018). Here, we present a new genetic model for the Cavanacaw deposit based on geologic observations and the detailed structural analysis of historic trench maps. This model is notably simpler than what has previously been proposed.

We demonstrate that the subvertical vein system at Cavanacaw strikes broadly N to NW and propagated within an overall ENE-WSW-striking sinistral shear zone system. The veins initiated as NNE-SSW-striking dilational veinlets and were rotated anticlockwise to their current N to NW strike orientations through progressive shearing. We show that as the veins were rotated through the normal of the shear zone they buckled to have the opposite sense of vergence to the overall shear direction. In areas where the veins were rotated enough to strike perpendicular to the overarching maximum principal stress, the veins clearly accommodated late internal thrusting. As orogen-parallel, ENE-WNW-striking sinistral shearing is widely documented to have occurred across NW Ireland during the late-Scandian event of the Caledonian orogeny (430-400 Ma), we interpret the Cavanacaw deposit to be Siluro-Devonian in age (Dewey and Stratchan, 2003).

Despite the interpretations of previous studies (e.g., Earls et al., 1996; Parnell et al., 2000), the structural model presented for Cavanacaw demonstrates that the deposit is younger than the nearby Curraghinalt deposit, which is now respectively constrained to a postorogenic "collapse" episode following the Grampian event (ca. 462.7-452.8 Ma) (Rice et al., 2016; Shaw et al., in prep). Instead, we highlight that the vein system at Cavanacaw propagated under a common palaeostress field to the Cononish, Croagh Patrick, and Clontibret gold vein deposits that are located further afield in the Laurentian Caledonides of Ireland and Scotland.

Fig. 1. Deposit-scale geologic map of the Cavanacaw deposit.


N
Botera
Kearney North
Botera Upper
CROCKARD
Botera Burn
Luis Shear Zone
Aghee
Sammy's
Peter's
CROCKNAMOHIL
Elkin's
Kearney
Joshua's
Kerr
Cavanacaw
Lack Shear Zone
Creevan Burn
Brendan
Discovery
Glenfern
Sharkey
Princes
Gormley Main
Tattykeel
Black
G.West 2
G.West 1
Garry
Tattykeel
Key:
Vein
Shear zone
Mining lease
Freehold land
0
500m
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371,000
370,000
239,000
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