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A NOTE ON THE '*IN-SITU*' OCCURRENCE OF KORNERUPINE IN THE OKKAMPITIYA GEM FIELD OF SRI LANKA

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ABSTRACT

Highly valuable and rare gems are common in the Okkampitiya gem field in the south eastern sector of the island. During a recent field investigation in the region we were able to locate a few new *in-situ* and residual gem deposits. Kornerupine, zircon, diopside, corundum and spinel are among these deposits. Although several alluvial kornerupines have been recorded from elsewhere in the country, particularly from Ratnapura gem fields, this is the first time that fine quality kornerupine has been found as *in-situ* occurrences. Some faceted kornerupine from the region shows good asterism. Zircon, diopside and corundum are among the other *in-situ* gems which were found in the Okampitiya area. The occurrence of valuable gem deposits in the area suggests that the region can be considered as a small mineralized terrain in the country.

INTRODUCTION

Gem minerals are by far the most economically valuable mineral resources in Sri Lanka. Though the total land area of Sri Lanka is only 65,600 km^2, recent studies have shown that more than 20% of the total land area of Sri Lanka is potentially gem bearing (Gunaratne and Dissanayake, 1995). Among the gem-bearing countries of the world, Sri Lanka is also considered as the largest producer of various types of fine gem varieties per square kilometer. Major gem minerals found in Sri Lanka are corundum, chrysoberyl, beryl, garnet, tourmaline, zircon, spinel, topaz, apatite, feldspar and quartz.

Geologically, more than 90% of the island of Sri Lanka is underlain by metamorphic rocks of Precambrian age. The metamorphic region of Sri Lanka is divided into three main lithotectonic units named as Wanni Complex (WC), Highland Complex (HC) and Vijayan Complex (VC) (Cooray, 1994) (figure 1). As described by Dissanayake and Rupasinghe (1995), most of the gem deposits are located in restricted zones within the area occupied by rocks of the Highland Complex. Gem minerals in Sri Lanka are mainly found in paleo-alluvial formations buried at some depth in the wide strike valleys around Ratnapura, the main gem bearing region of Sri Lanka. Other than these alluvial gem bearing beds, *in-situ* and elluvial type deposits are also found in gem fields in Sri Lanka.

Geological setting of the study area

Okkampitiya and Kumbukkana are two adjacent gem-producing areas in the southeast of Sri Lanka This region is a part of the Buttala Klippe, which comprise, high grade supra crustal rocks and orthogneisses (figure 1). A wide variety of fine quality gems such as blue, yellow and pink sapphires, spinels, garnets (hessonites), tourmalines and zircons are found in this gem field. Some of the green and yellow zircons found in this area are showing higher radioactivity and metamictization characters (Mahatantila, 2004). Furthermore, highly radioactive ekanites have also been recorded in this important gem field (Vithanage et al., 2006).

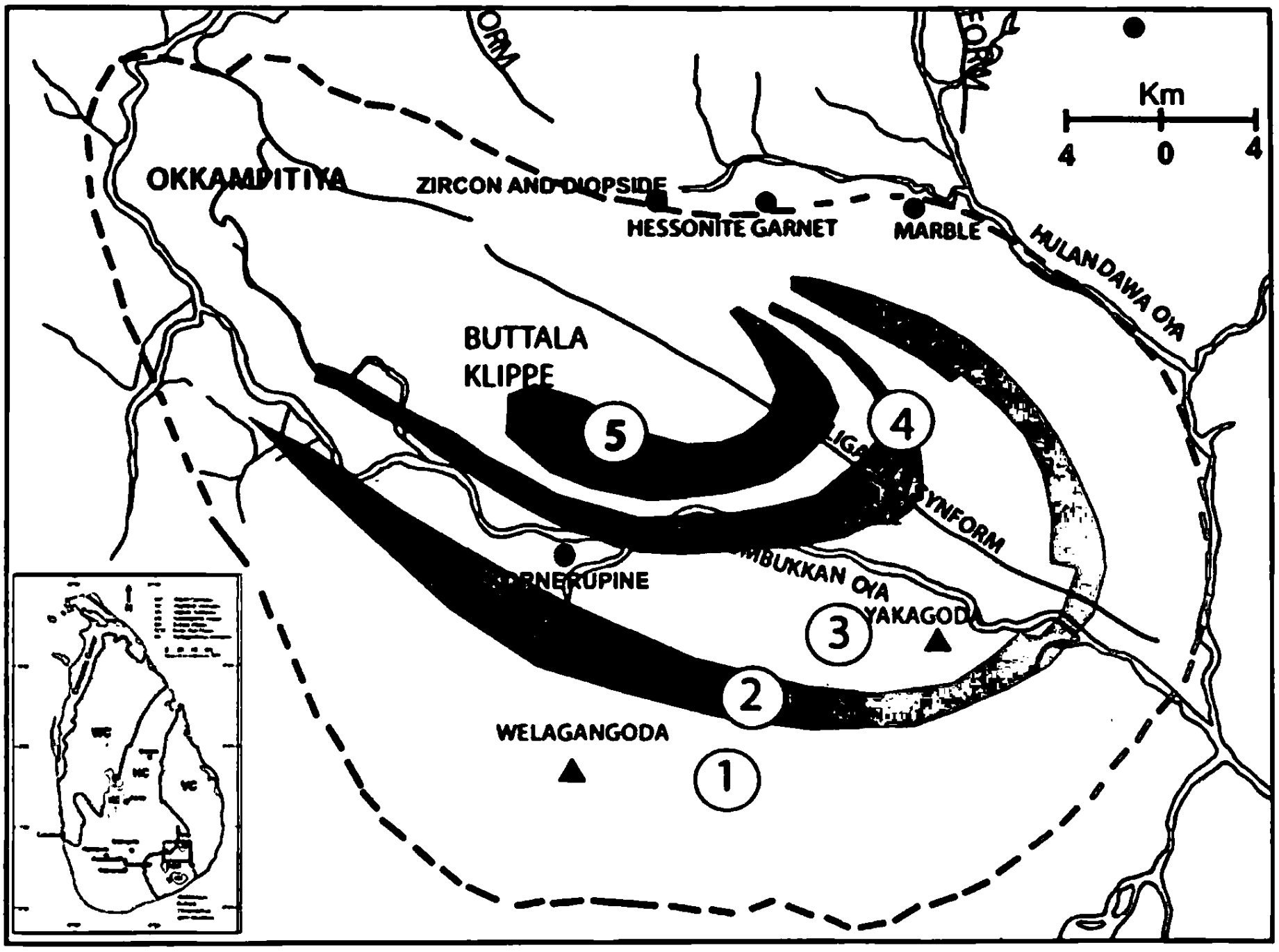

Fig: 1. In-situ occurrence of Kornerupine

Kornerupine is Mg-Al-B bearing silicate and considered to be a very rare gem mineral. It is one of the few minerals that contains boron and thus can provide insights into the effect of the B—Al, Si, Al substitution (Wopenka et al., 1999). This rare mineral is well known for its colour variation property and is firstly found in Fiskernaeset, Greenland. The intense green colour of kornerupine is sometimes similar to that of emerald and it also shows asterism. (Güttler and Aloys, 2004).

Kornerupine is found commonly in paleo-fluvial gem beds of Ratnapura. Non-gem quality in-situ kornerupine has been recorded in a sheared pegmatite from Homagama, near Colombo (Grew et al., 1995). Zwann (1996) has recorded in-situ kornerupine from Embilipitiya, showing diverse physical properties due to variation of Mg/Fe ratio, but there is no record of fine gem quality in-situ kornerupine occurrence in Sri Lanka. This is the first time in Sri Lanka, fine gem quality in-situ kornerupine from Okkampitiya gem fields in the Uva Province of Sri Lanka were reported. The Okkampitiya gem field is particularly important since several important in-situ occurrences of gem minerals such as spinel and hessonite garnet (Chandrajith et al., 1998). During this study in-situ deposits of zircon and diposide were recorded.

This particular kornerupine deposit is found adjacent to the Yala National Park boundary and Kumbukkan Oya where extensive illicit gem mining is taking place (figure 1). This deposit is found in a weathered overburden and gem miners were recovering fine quality kornerupine from the deposit. The traditional digging and tunnelling method were used to mine the deposit. The kornerupine were found at 2 m depth from the surface. However, kornerupine was also found in the unweathered portion of the host rock during the field survey. The host rock to kornerupine is mainly consisting of highly irregularly grains of plagioclase. Some large grains of plagioclase show strong wavy extinction with bent twining lamelle, which indicates strong deformation in the formation. The kornerupines found in the host rock is consisting of orthorhombic crystals with sharp faces. The kornerupine-bearing rock is mined as pieces from the host rock, carefully broken and hammered to separate the mineral. Fine gem quality kornerupine were found in this unweathered rock and the colour of grains is varying from dark green to light green. Some of the recovered kornerupines from this particular deposit showed an asterism and cats eye effects when they were faceted (figure 2).

In-situ occurrence of other minerals

Associated with the above kornerupine deposit, in-situ occurrence of gem quality spinel embedded in a weathered marble was also found. Some of the spinel crystals are opaque but some are violet coloured transparent (figure 3). According to the gem miners in the area, this stretch of land is also popular for residual occurrence of geuda (corundum). It is also important to note that an occurrence of zircon-bearing pegmatite (figure 4) located close to the in-situ hessonite garnet deposit, which has been described earlier by Chandrajith et al. (1998). Both transparent and opaque zircon crystals are found in a marble and gem quality diopside occurrences were also observed in the same host rock (figure 4). The outcrop of zircon and diopside-bearing host rock can be seen in a larger extent (about 50 m^2) compared to kornerupine occurrences. The gem quality diopsides are dark green to light green in colour. Field observations shows that the entire region is underlain by a marble formation and local gem miners find gem quality sapphires from this formation.

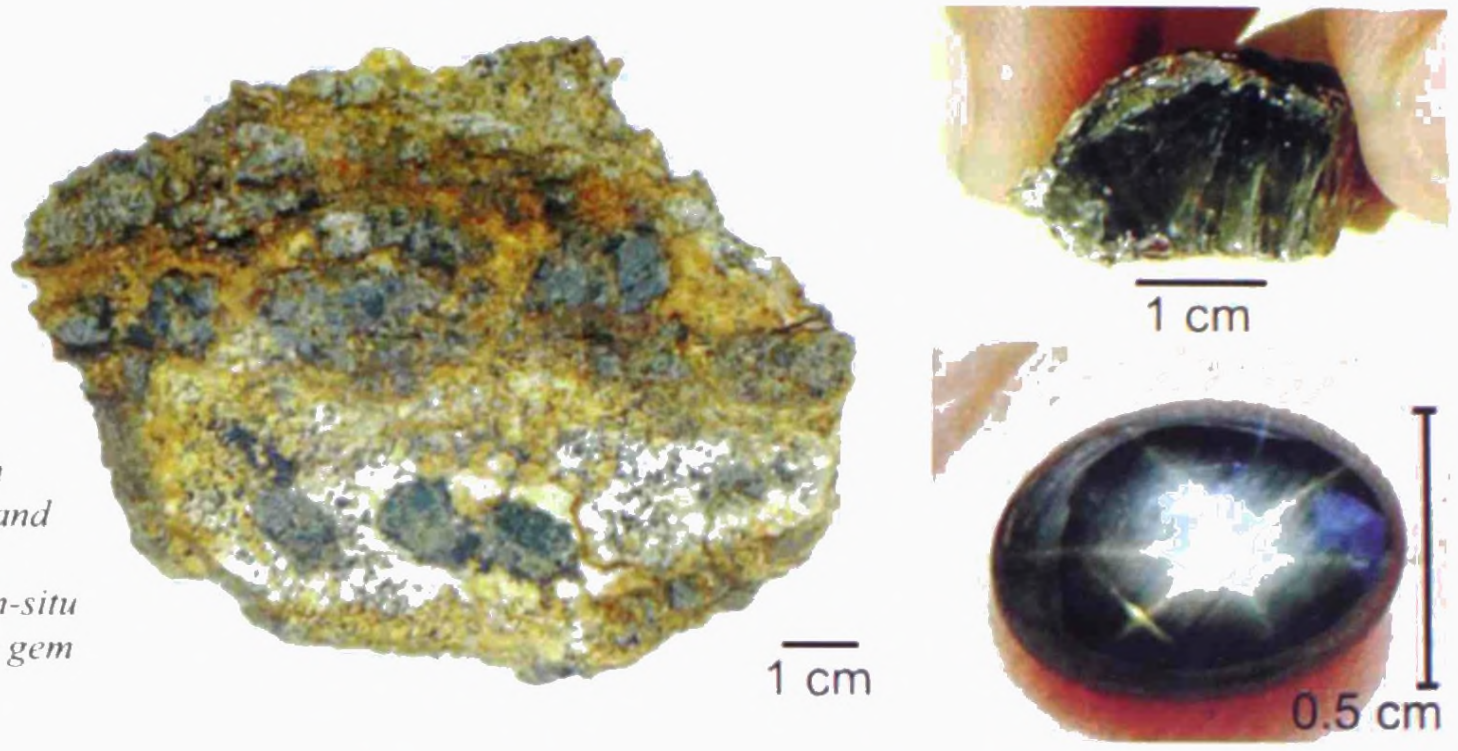

Fig: 2. *Kornerupine in partly weathered rock and asterism of faceted kornerupine from the in-situ deposit in Okkampitiya gem fields.*

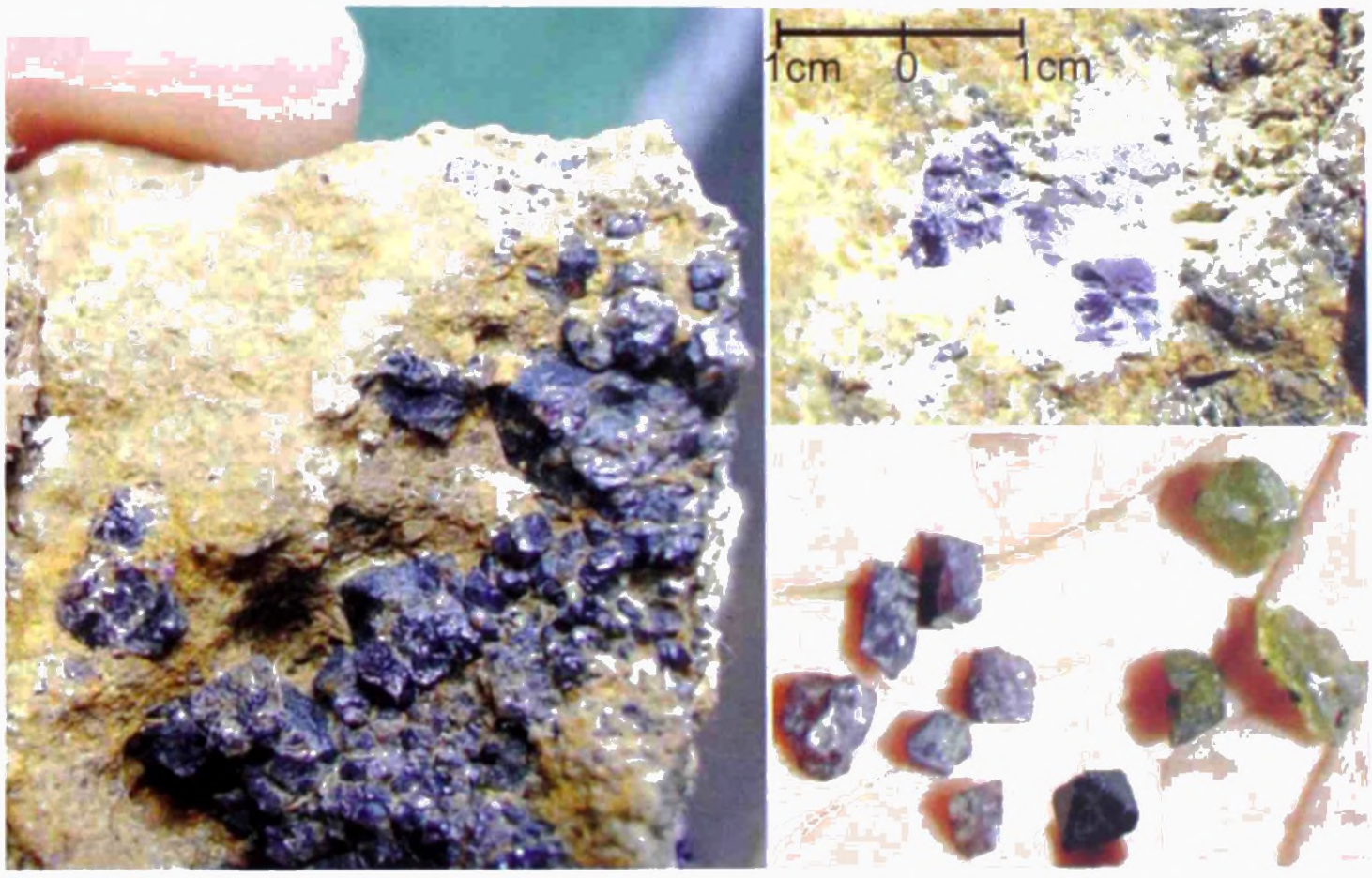

Fig: 3. *Spinels and diopside found from the Okkampitiya gem field*

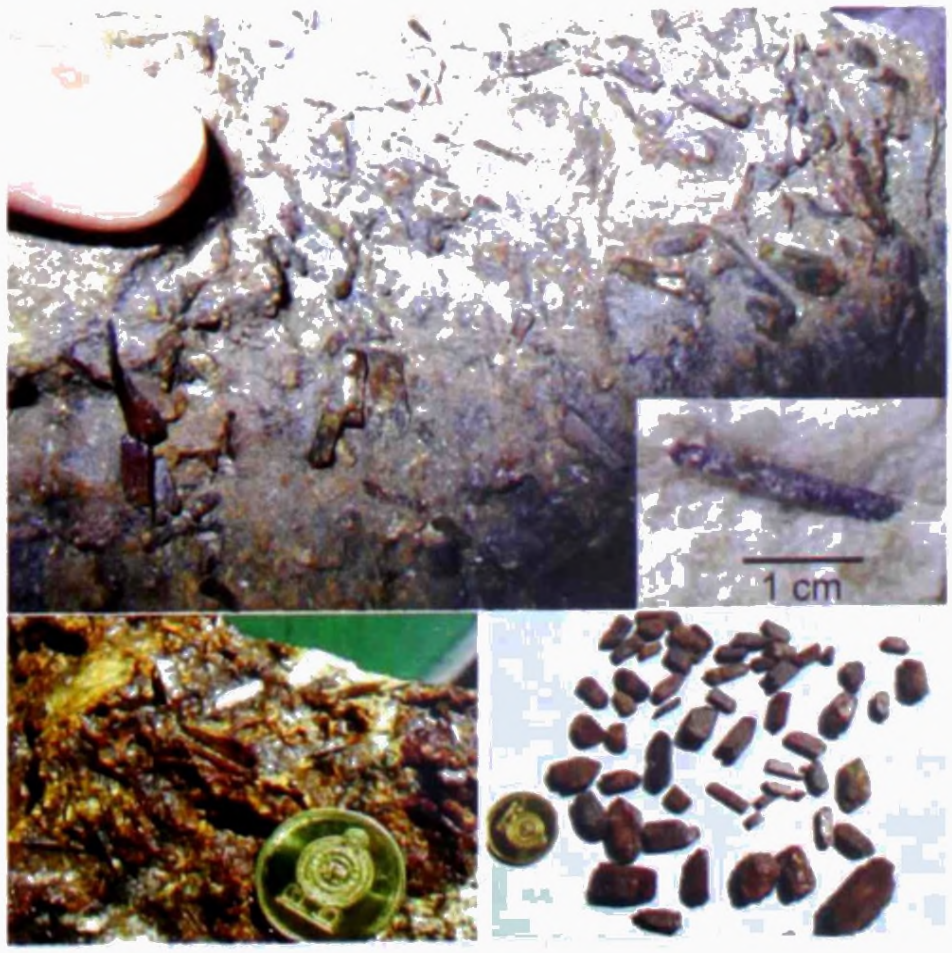

Fig: 4. *In-situ and residual zircon in the Okkampitiya gem field*

The study area comprises of Highland Complex rocks indicating that there were petrological conditions suitable for the formation of gemstones. The occurrence of several important in-situ minerals in a fairly small patch of the Okkampitiya gem field suggests that the area is a possible mineralized zone in Sri Lanka. The gem deposits in the region are mostly of the in-situ or residual type and possibly originated through metasomatic alterations of marble by late magmatic fluids as suggested by Chandrajith et al. (1998) or gemstones originated with the influx of later stage granitic melts which now occurs as post metamorphic pegmatites. Further detailed investigations of kornerupine and zircon-diopside deposit would probably provide a pathway to determine the origin of gems in the region.

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