

Tillite in the Togo formation in Ghana

SIR,—In southern Ghana the two basement-blocks, the Birrimian and the Dahomeyan, are separated by a very distinct morphological feature, the Togo–Akwapim range. This range is composed of the so-called Togo formation thought to have been folded and metamorphosed in the 500–600 Ma ‘Pan-African Orogeny’ (Grant, 1969). The Togo formation comprises quartzites and phyllites. Phyllite exposures at the extreme south-western part of the Togo–Akwapim range have been studied in detail by the writers.

Within the area concerned (see Fig. 1) the Togo formation was affected by at least 2 deformational phases (Fitches, 1970). The first of these produced large-scale folds, thrusts, and mylonitization. It was accompanied by a low greenschist-facies metamorphism. The axial planes of the folds trend NE, i.e. parallel to the present high range.

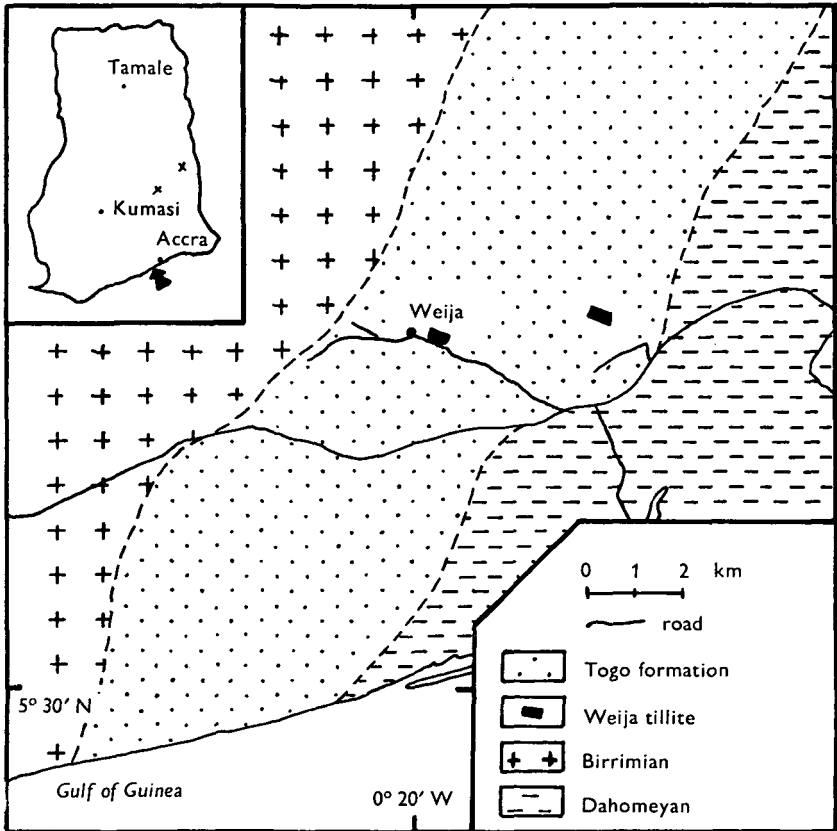


Figure 1. Generalized geological map of the area west of Accra with an indication of the 2 tillite localities. Crosses on the inset map indicate earlier described Buem and Voltaian tillite localities.

The second phase produced locally north-trending kinkfolds in the phyllites and small open folds in the quartzites.

The cleavage of the phyllites is defined by oriented muscovite and in places chlorite. Quartz occurs as small strained grains in well-defined thin bands and lenses parallel to

the cleavage. Generally the phyllites have a rusty appearance due to a high content of iron oxides and hydroxides. They are usually covered by soil or quartzite. Because of recent quarrying 2 large exposures (indicated in Fig. 1) of a phyllite of different character have been found. The deformational phases and the mineralogical composition are the same as for the 'normal' phyllite. The phyllite outcropping at these 2 localities has no rusty appearance (obviously the iron-content is small), but what really distinguishes this phyllite is, however, the presence of boulders and pebbles. The amount of matrix is greatly in excess of boulders and pebbles.

The size of these clasts varies from big boulders with an observed maximum diameter of 50 cm down to microscopical grains. The following rock types are found as clasts: sandstones, quartzites, schists, gneisses, and granites. The smaller grains are in most cases quartzites. All the different clasts are haphazardly mixed – with respect to size as well as rock type. Their original shape seems to have been preserved. A few of the clasts are rounded and kidney-shaped but most of them have a flat shape with rather sharp edges. Some are polished, some are faceted, and 2 show striations. No sedimentary structures are found in this lithological unit, which has a thickness of more than 6 m.

Several authors have described tillites of various ages, most of these descriptions being from undeformed deposits. It can be very difficult to obtain conclusive evidence for a glacial origin even with respect to undeformed deposits (Schermerhorn & Stanton, 1963). The rock described in this paper has been deformed and slightly metamorphosed, but nevertheless the writers find that the characteristics mentioned above are clear enough to justify its identification as a tillite.

The recognition of the Weija tillite has 2 important aspects:

(1) If compared and contrasted with the proposed tillite occurrences in the Buem formation and the Voltaian group in Ghana (Junner, 1940; Junner & Hirst, 1946) (see Fig. 1) the Weija tillite may be additional information in establishing the true age relationship between the Togo formation, the Buem formation, and the Voltaian group.

(2) With respect to the age of this tillite, it is of course a fact that it was deposited before the folding and metamorphism in the 500–600 Ma 'Pan-African Orogeny'. As the Togo formation is Upper Precambrian or Infracambrian in age the recognition of the Weija tillite lends further support to the Varangian glaciation (Harland, 1964) and its effects in Africa.

The writers thank the staff of Department of Geology, University of Ghana, for help during this work.

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22nd May 1973

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