Journal of African Earth Sciences 114 (2016) 74–77

Contents lists available at ScienceDirect

Journal of African Earth Sciences

journal homepage: www.elsevier.com/locate/jafrearsci

An age for Kajong, a Miocene fossil site east of Lake Turkana, Kenya

Francis H. Brown [a, *], Brian R. Jicha [b], R.E. Leakey [c]

[a] Department of Geology and Geophysics, University of Utah, Salt Lake City, UT 84112-0102, USA
[b] Department of Geoscience, University of Wisconsin–Madison, 1215 W. Dayton St., Madison, WI 53706, USA
[c] Department of Anthropology, Stony Brook University, Circle Road, Social & Behavioral Sciences Building, 5th Floor, Stony Brook, NY 11794-4364, USA

ARTICLE INFO

Article history:
Received 13 October 2015
Received in revised form
18 November 2015
Accepted 20 November 2015
Available online 24 November 2015

Keywords:
Kajong
Mwiti
Archaeobelodon
Brachypotherium
Gomphotherium
Marsabit
Turkana
Kenya
Miocene

ABSTRACT

The Kajong Formation in Marsabit District, northern Kenya has yielded a Miocene mammalian fauna consisting of nine taxa. It is capped by a basalt $^{40}Ar/^{39}Ar$ dated at 19.1 ± 0.1 Ma, and a volcanic clast from a conglomerate within the formation yielded an age of 20.3 Ma, only slightly older. The entire fauna from this site thus lies close to the base of the Miocene Epoch and is older than 19.2 Ma. The site has yielded some of the oldest examples of *Archaeobelodon filholi*, *Prodeinotherium hobleyi*, and *Gomphotherium* sp. in east Africa.

1. Introduction

An early foray of the Koobi Fora Research Project in 1973 under the direction of one of us (REL) retrieved a relatively complete proboscidean skull from a site then called Mwiti. Later, Savage and Williamson (1978) reported a mammalian fauna from the same general area with eight taxa (not including the original proboscidean skull), and concomitantly they named the site Kajong, its sedimentary deposits the Kajong Formation, and the overlying lavas the Loiengalani Formation. Kajong lies northwest of Loiyangalani at 3.023° N, 36.567° E, where sedimentary strata are exposed discontinuously over an area of ~10 km^2 in the Balo and Sera Iltomia drainages (Fig. 1). As noted, the site was initially known as Mwiti (e.g., Leakey et al., 2011), probably a reference to Moiti, the tallest mountain east of Lake Turkana that lies about 45 km northwest of the fossil locality, but it should now be referred to as Kajong to reduce confusion. At the time Tassy (1979) wrote that the *Gomphotherium* from Kajong was the "only [specimen] from East Africa that can be attributed to the genus *Gomphotherium* with a fair margin of security."

Williamson and Savage (1986) and Savage and Williamson (1978) distinguished six geological units in the Kajong area: 1) Metamorphic basement; 2) the Sera Iltomia Formation (250 m; unknown age), 3) the Kajong Formation (210 m or 160 m given by Williamson and Savage, 1986; Miocene); 4) the Loiengallani Formation (>200 m; Miocene); 5) unnamed post-Miocene volcanics (unknown thickness); and 6) post-Miocene sediments (20 m, suggested to be Holocene). They described the Kajong Formation as sedimentary strata resting unconformably on metamorphic basement or on the Sera Iltomia Formation and below basalts of the Loiengallani Formation.

Savage and Williamson (1978) divided the Kajong Formation into four members numbered 1–4 from the base upward, and they interpreted the formation as being composed predominantly of fluvial deposits, with some strata of probable lacustrine origin in Member 1. Because conglomerates at the base of fining upward sequences in Member 2 are made mainly of rounded quartz pebbles in a feldspathic arenite or litharenite matrix, they suggested that source materials for the sedimentary rocks are derived from metamorphic basement south-southwest of Lake Turkana.

* Corresponding author.
E-mail addresses: frank.brown@utah.edu (F.H. Brown), bjicha@geology.wisc.edu (B.R. Jicha), richard.leakey@stonybrook.edu (R.E. Leakey).

http://dx.doi.org/10.1016/j.jafrearsci.2015.11.017
1464-343X/

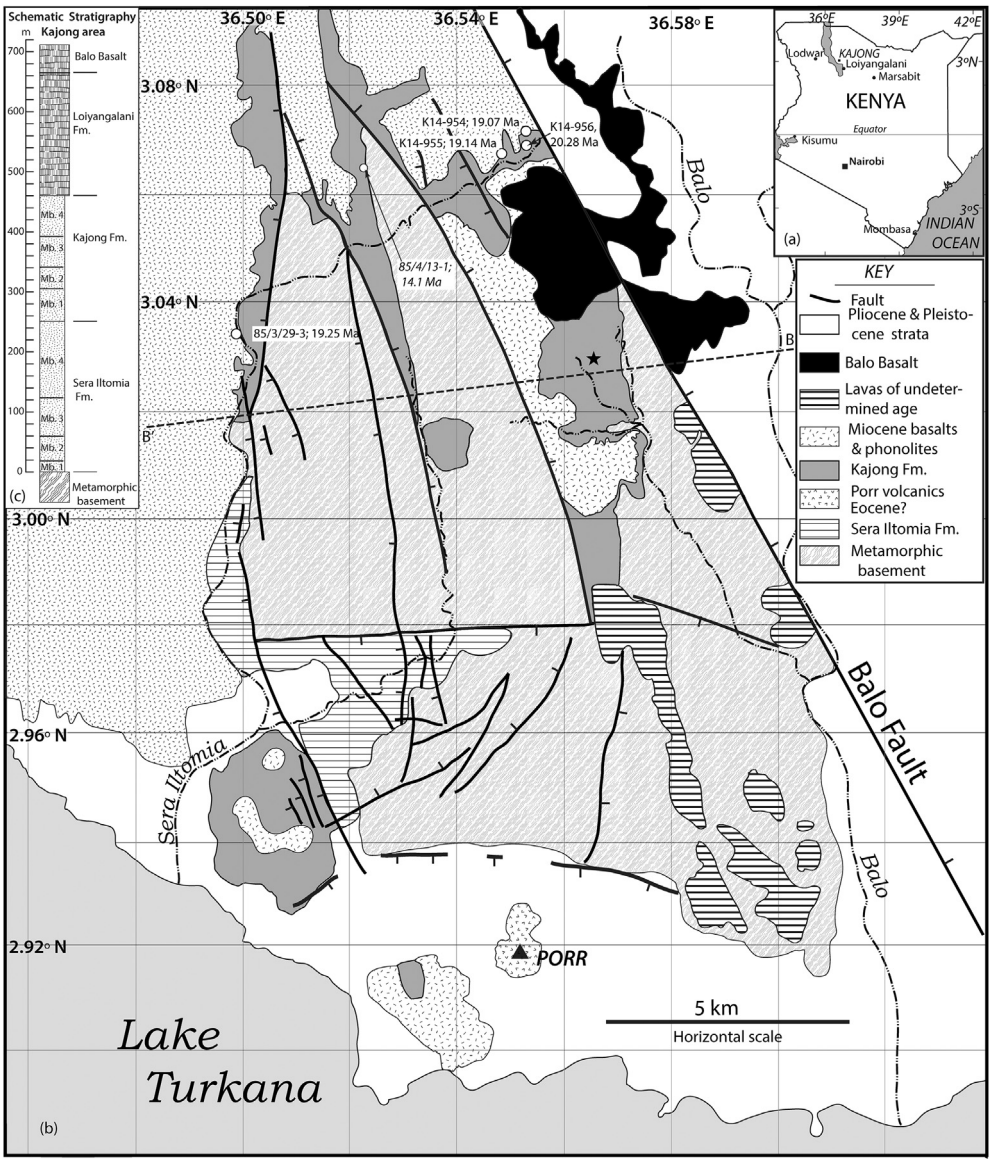

Fig. 1. a) Inset map showing the general location of the Kajong Formation; b) Geology of the Kajong Formation and surrounding rocks (modified from Savage and Williamson, 1978; and Gathogo et al., 2008) showing the location of dated samples and the *Archaeobelodon filholi* skull and mandible (star), and line B–B′ which is the approximate location of the section given in Williamson and Savage (1986); c) Schematic column of formations in the Kajong area from Savage and Williamson (1978) and Williamson and Savage (1986). We have mapped the volcanic rocks at Porr as Eocene based on the K/Ar age of sample W649 (35.2 ± 1.8 Ma) reported by Wilkinson (1988). Sample 85/4/13-1 is italicized because the sample is probably mislocated.

The Miocene basalts were termed the Loiengalani Fm. (Savage and Williamson, 1978), the Loiengallani Fm. by Williamson and Savage (1986), and the Loiyangalani Fm. by Ochieng' et al. (1988) and Rop (1990). We follow the spelling Loiyangalani Formation here. Wilkinson (1988) mapped these basalts as part of the Jarigole Phonolites. Ochieng' et al. (1988) used the term Loiyangalani Formation for "conglomerates, sandstones and limestones" along the eastern shore of Lake Turkana, but the sequence they described has since been correlated with the Koobi Fora Formation by Gathogo et al. (2008). These latter rocks are lithologically entirely distinct from the basalts originally described as the Loiyangalani Formation.

No type section or type locality was given by Savage and Williamson (1978), but Williamson and Savage (1986) depict the formation on their cross section B–B′ (see Fig. 1), which shows the Loiyangalani Formation capping the Kajong Formation in a fault block near the site of some fossils, and also along the western margin of exposures of the Kajong Formation.

As noted by Gathogo et al. (2008), the Balo Fault (Fig. 1) separates Miocene rocks resting on metamorphic basement west of the fault from Pliocene rocks of the Koobi Fora Formation resting on metamorphic basement east of the fault. There is no Miocene section in the vicinity of Kajong east of the Balo Fault, and no Pliocene section west of the fault. Thus, motion on the fault apparently reversed sometime between the middle Miocene and the early Pliocene. The Balo Basalt, dated at 1.79 ± 0.02 Ma (Gathogo et al., 2008), overlies both the Loiyangalani Formation and the Koobi Fora Formation, straddling the fault (Fig. 1). The Balo Basalt is dropped down by ~60 m to the east, motion which must have occurred since its eruption.

Williamson and Savage (1986) quote a K/Ar date of 18.50 ± 0.45 Ma for the base of the Loiengallani Formation (Fitch & Miller Associated, Cambridge, unpub. data), but gave no analytical