

A SUNDIAL FOUND IN THE EGYPTIAN VALLEY OF THE KINGS

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The University of Basel Kings' Valley Project is investigating a number of non-royal tombs in the famous necropolis of the Pharaohs on the west-bank of Luxor in Upper Egypt.¹ From the 15th to the 11th century BC, almost all the kings and a certain number of queens and officials were buried in this desert valley. The construction and decoration of elaborate tombs involved the continuous presence of workmen on the site. During their work shifts these workmen stayed in stone huts close to the place they were building, whereas their actual living quarters were at a certain distance in the village today called Deir el-Medina.

While clearing the entrance of an 18th dynasty (14th century BC) non-royal tomb in February 2013, remains of slightly younger workmen's huts were found. They contained the objects usually left in these structures, namely pottery plates and vessels as well as so called *ostraca*, flat limestone chips on which the workmen drew pictures or inscribed

texts.² Among these *ostraca* was the piece described here: one of the oldest Egyptian sundials (Fig. 1). The position of these huts in relation to the royal tombs in the Valley as well as the objects found within and around the huts indicate a date in the late 19th dynasty (*ca.* 1202–1190 BC), which also applies to the sundial.

Description

The sundial is made of a piece of local ochre limestone of irregular shape. The back of the instrument is left rough. The dimensions of the sundial are 15.5×17.5×3.6 cm. No traces of bore holes for a possible mounting of the sundial are visible. Size and material suggest that it is intended to be a mobile instrument. Since the piece of stone is pointed in the lower part, it may be that the sundial was simply put into the sand on the ground for time measurements. Alternatively, an original upper part of the instrument including bore holes for mounting may have broken off. On the front side a black horizontal line is drawn. Its original centre contains a bore hole with a depth of 10 mm and a diameter of 6 mm. There, the now-lost gnomon was inserted, presumably without inclination. The gnomon may have been a wooden, bronze or lead pole. The horizontal line marks the hour lines for 6am (left) and 6pm (right). The noon line (12am) runs in an almost right angle (91° and 89°, respectively) to the horizontal line. In between five extra lines are sketched in the morning and in the afternoon part of the sundial. Additionally, black dots are present indicating half hours. Based on the semicircular design of the dial plane it is obvious that this instrument is a vertical direct south sundial, *i.e.* the dial plane had to be vertical and facing south in order to read the time correctly.

Ancient Egyptian Time Measurement

The lapse of time between sunrise and sunset has customarily been divided into twelve equal parts in ancient Egypt. This means that an hour during winter is shorter (and during summer longer) than an equinoctial or equal hour used nowadays. Therefore, Egyptian hours are usually called unequal or temporal hours. Only at the equinoxes (EQU) do the length of a temporal hour match the length of an equal hour. For the geographical latitude φ of Luxor of approximately 25.5° N, the length of a temporal hour varies between 51 minutes at winter solstice (WS) and 69 minutes



Fig. 1. Sundial on a limestone ostrakon from the Valley of the Kings, 13th–12th centuries BC.