

NEW FIELD RESEARCH AT GALILI, AFAR STATE, ETHIOPIA



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Introduction

The paleoanthropological research potential of the sediments surrounding Mt. Galili in the Afar State of Ethiopia was first established by Y. Haile-Selassie in the late 1990s. Subsequently, a team led by H. Seidler conducted a series of field campaigns through 2010. During their span, these projects discovered a number of valuable fossils, including hominins, that verified the importance of the area and provided a biochronological and geochronological framework for the sediments that span the ca. 2.5 Ma to >4.5 Ma period.

Field research of the Mt. Galili Formation was reinitiated by our team in 2016. The goals were to collect additional paleontological, geological, and archeological materials to better understand the biotic context during this period and provide additional age control of the deposits. While the first season focused on sediments on the middle Pliocene-aged Shabeley Laag Member (3.97~3.87 Ma) (Hujer, et al., 2015), the second season spent substantial time in the slightly older Dhidinley Mbr. (<4.43-3.97 Ma). Altogether, a diverse array of terrestrial non-hominin (especially monkeys, suids, proboscideans, and bovids) and hominin fossils were collected. As noted by previous workers, the sediments are dominated by fluvial and lacustrine deposits with numerous intercalated air-fall tuffs and intrusive basalts. A number of geological specimens were collected and exported and await radiometric dating and tephrostratigraphic correlation analysis. Here, we will present preliminary results from the 2016 and 2017 field surveys.

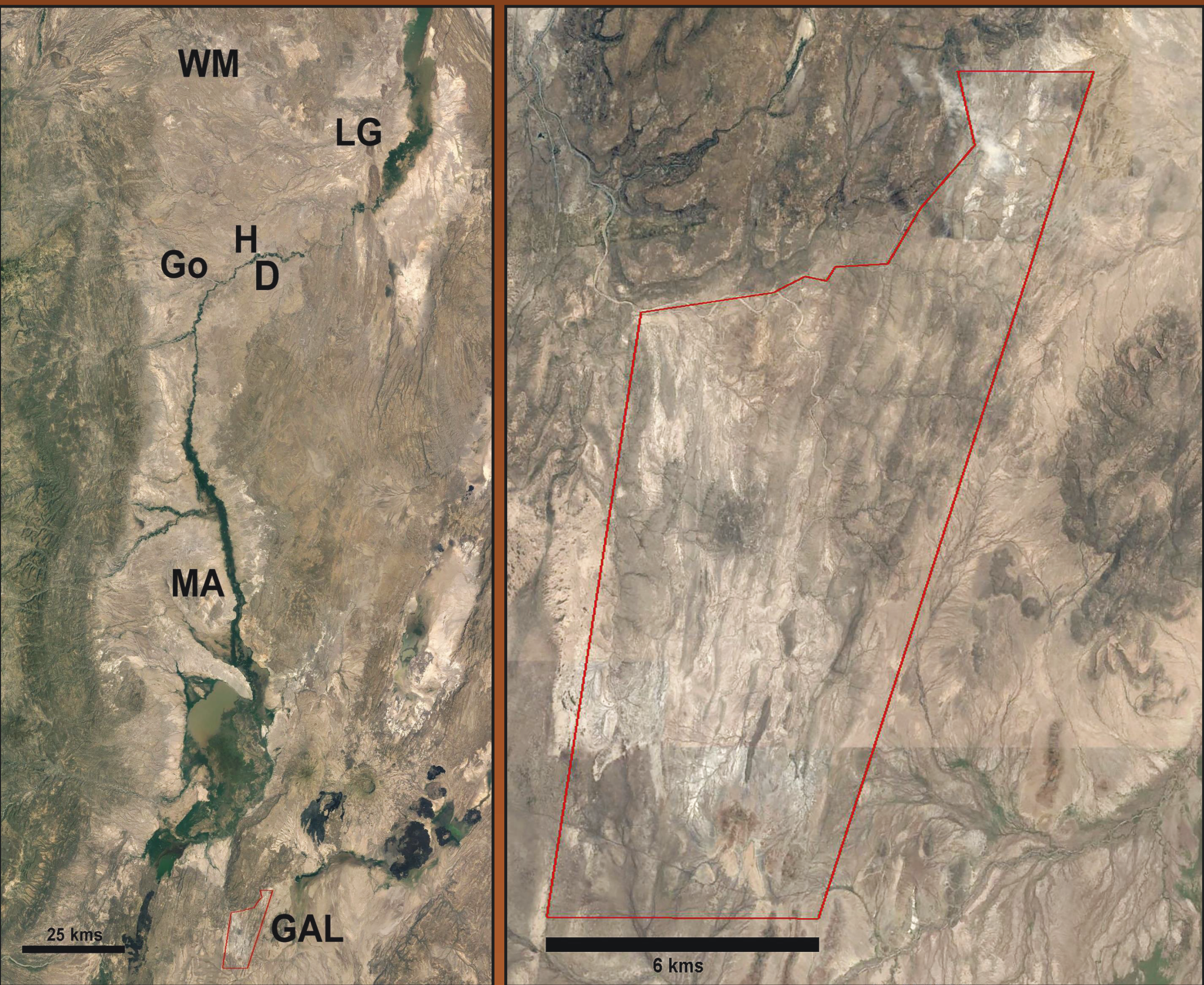


View looking north towards Mt. Galili. The crew is surveying in the ca. 3.9 Ma Shabeley Laag Mbr. that is capped by the Galili Basalt seen atop the left ridge.

GEOLOGY

The Galili Paleoanthropological Project area lies on the eastern shoulder of the northern Main Ethiopian Rift as it transitions into the southern Afar Depression. The entire region has been undergoing extension since the Miocene, creating fault-bounded basins, including the Galili area, that are then filled by volcanic and sedimentary rocks. The Mt. Galili Formation consists of a series of interlayered basin sediments and volcanic tuffs and flows. Hujer et al. (2015) estimate a composite thickness for the Mt. Galili Formation of ~230 meters, although there is considerable uncertainty in this estimate, due to extensive normal faulting. In general, the Mt. Galili Formation is tilted west-northwest at 5-10°, and strikes N-NE. The sediments are stepped down to the east due to a series of generally east-dipping normal faults. Despite the faulting, the age of deposits generally decreases westward. Sediments dominate the Galili Formation, and we agree with Hujer et al. (2015) that these are mainly deposited by large lakes and rivers in a large, probably fault-bounded graben or half-graben, analogous to processes in many rift basins in southern Ethiopia today. The presence of flows and coarseness of the air-fall tuffs shows that nearby volcanic centers were active throughout the Pliocene, although these sources have yet to be identified. The project area is also locally intruded by basalts focused along major faults.

To date, our research has focused on the Shabeley Laag (ca. 3.9 Ma) and Dhidinley (ca. 3.9-4.4 Ma) members. Our team is currently analyzing newly collected volcanic samples to refine the geochronological age control of the sediments.

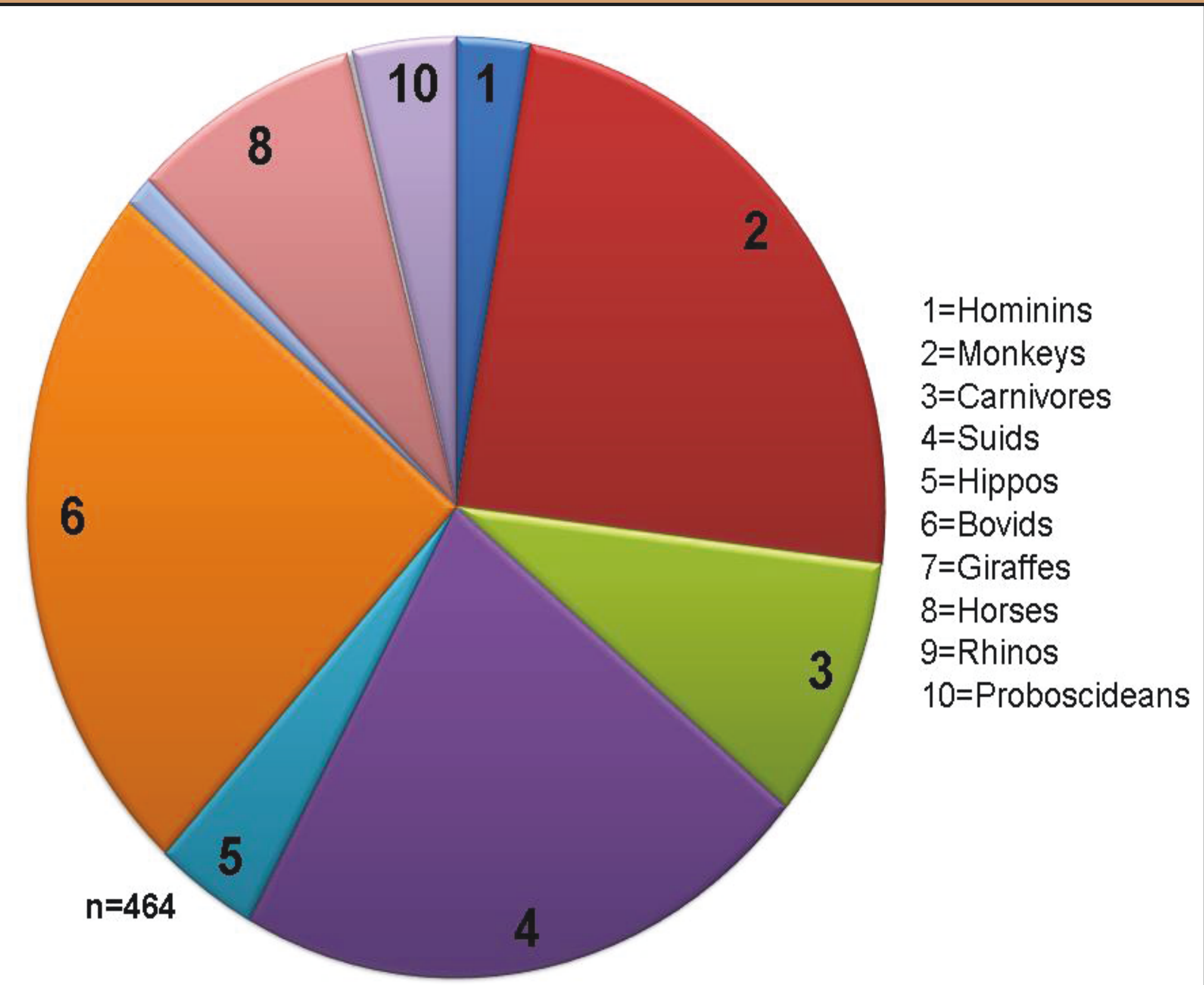


Left: Satellite imagery showing the location of the some of the paleoanthropological research projects in the Afar State, Ethiopia. GAL=Galili,, MA=Middle Awash, Go=Gona, D=Dikika, H=Hadar, LG=Ledi-Geraru, WM=Woranso-Mille. Right: Satellite image of the Galili Paleobiology Project study area boundary. (Google Earth)

Paleontology

In the course of two field season, the team has collected and cataloged 529 paleontological specimens from a diversity of taxa ranging from fish to proboscideans with an emphasis on terrestrial vertebrates. The collection strategy includes sampling all hominins, primates, carnivores, microfauna, and aves. Bovid, giraffid, suid, and equid craniodental and selected postcrania are collected. We collect incomplete but taxonomically identifiable teeth for isotopic analyses. Proboscidean dental material is collected and larger specimens (e.g., crania, postcrania) are currently field curated and documented (photographs and GPS coordinates). Hippopotamidae craniodental material is collected. Bulk collections of fish, chelonians, and crocodylia are made at selected localities.

The figure below is a gross representation of the relative composition of the taxonomically identifiable terrestrial mammals from the 3.9-4.4 Ma Shabeley Laag and Dhidinley Mbrs. The monkeys are dominated by cercopithecines, including *Theropithecus* and papionines, with fewer colobines. There is a diversity of carnivores including hyaenids and lutrines. The most common suids are the tetraconodonts *Nyanzachoerus kanamensis*, *Notochoerus jaegeri*, and early *No. euilus*. The suine *Kolpochoerus millensis* is an uncommon member of the guild. The bovid taxa represented include Tragelaphini, Reduncini, Aepycerotini, Alcelaphini, Bovini, and Neotragini. The equid *Eurygnathohippus* is common with some of the specimens attributable to *E. woldegabrieli*. The proboscideans include *Elephas*, *Anancus*, and *Deinotherium*. The few Rhinocerotidae and Giraffidae fossils reflect their rarity in the record. Fauna not included here include mammalia indet., aves, microfauna, and bulk samples of fish and reptiles.



Left: A sandstone nodule containing a suid cranium (left-apex of nasal bones, right-nuchal crest). Right: The suid cranium following initial preparation.

Archeology

The Galili project area has produced numerous cultural remains including Middle Stone Age and Late Stone age lithics. These tools are unusual as many of them were made from petrified wood (Palm) and petrified trees are still present in the study area. All of these artifacts were recovered from the surface.



Hominins

To date, 13 hominins have been discovered including eight isolated teeth, cranial fragments, a mandibular dentition, and three upper limb elements. These fossils were recovered from the Shabeley Laag and Dhidinley Members. Of those elements that can be assigned reasonably to taxon, these include *Australopithecus* sp., *Australopithecus* cf. *anamensis*, and cf. *Ardipithecus*



Left: Hominin proximal right humerus (W. Amerge). Middle: Canine (K. Kero). Right: Right distal humerus (W. Amerge). All of these hominins were recovered from the Dhidinley Member in 2017.

Literature Cited

Hujer, W.; Kuiper, K.; Viola, T.B.; Wagleich, M.; Faupl, P. 2015 Lithostratigraphy of the Late Miocene to Early Pleistocene, hominid-bearing Galili Formation, southern Afar depression, Ethiopia. Austrian Journal of Earth Sciences 108:105-127.

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