LUCA

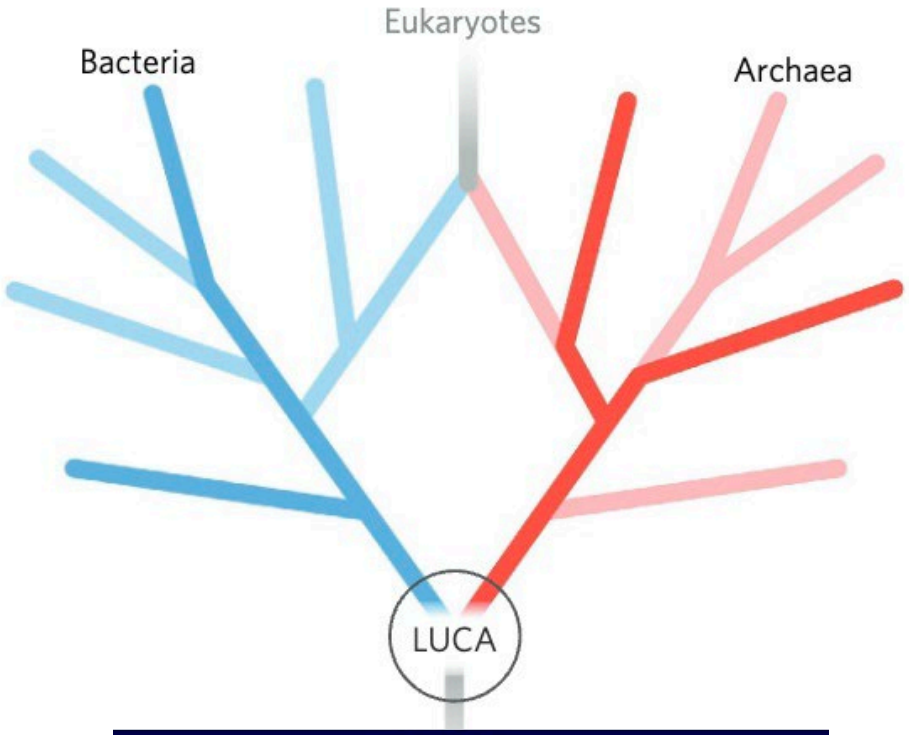


Figure 1 | Phylogeny for LUCA's genes. In the two-domain tree of life[5,6], eukaryotes stem from prokaryotes, so the last universal common ancestor, LUCA, is the ancestor of archaea and bacteria. The tree shows a schematic phylogeny of phyla for a gene present in two archaeal and two bacterial phyla and in which both prokaryotic domains are monophyletic. By applying the criteria—(1) the gene should be present in at least two members each of two bacterial phyla and two archaeal phyla (see Methods) and (2) the protein tree should recover monophyly of bacteria and archaea—355 clusters were identified that trace to LUCA.

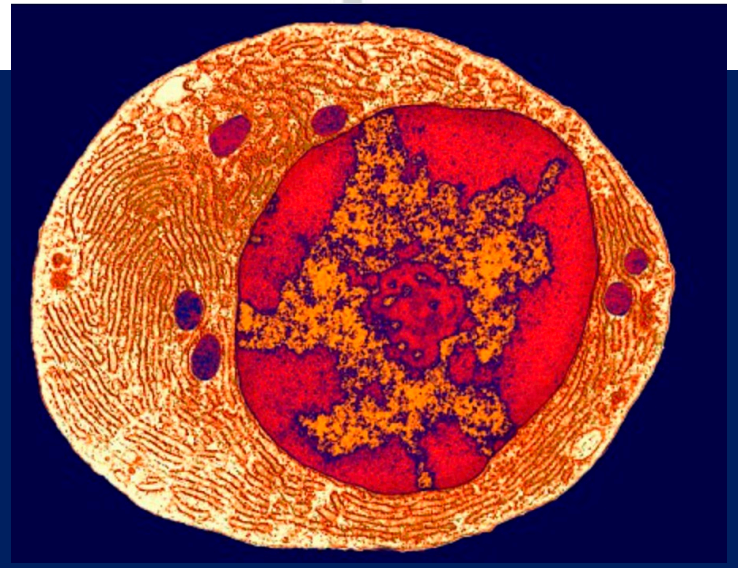
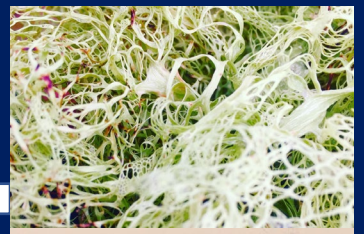


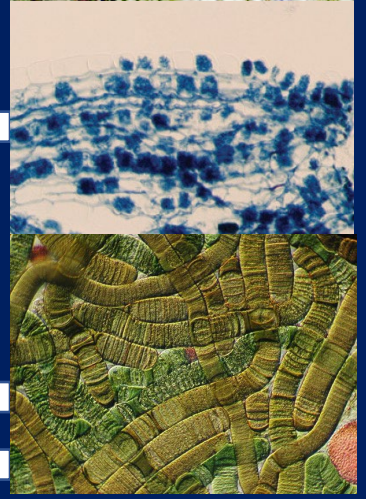
*Image / figure: *Nature Microbiology,* Weiss, M., Sousa, F., Mrnjavac, N. *et al.* The physiology and habitat of the last universal common ancestor. *Nat Microbiol* **1**, 16116 (2016). https://doi.org/10.1038/nmicrobiol.2016.116

*Image: *Marek Mis, Science Photo LIbrary*

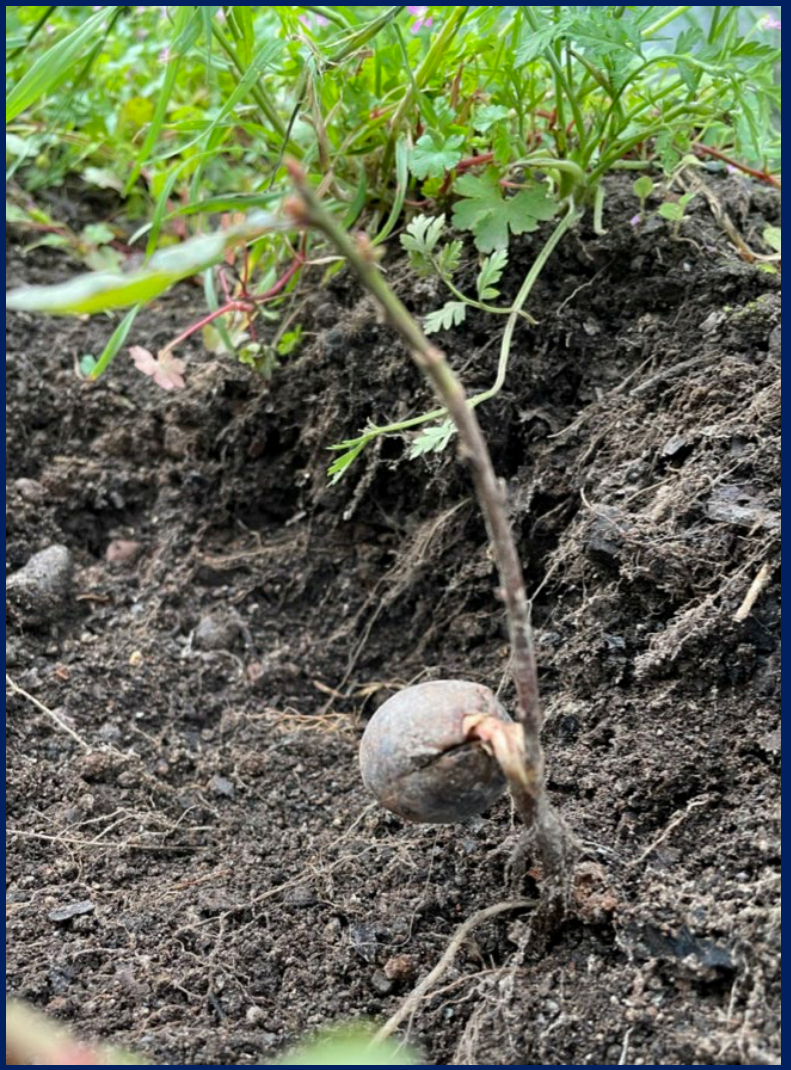
Coevolution of Life and Nutrient Cycles

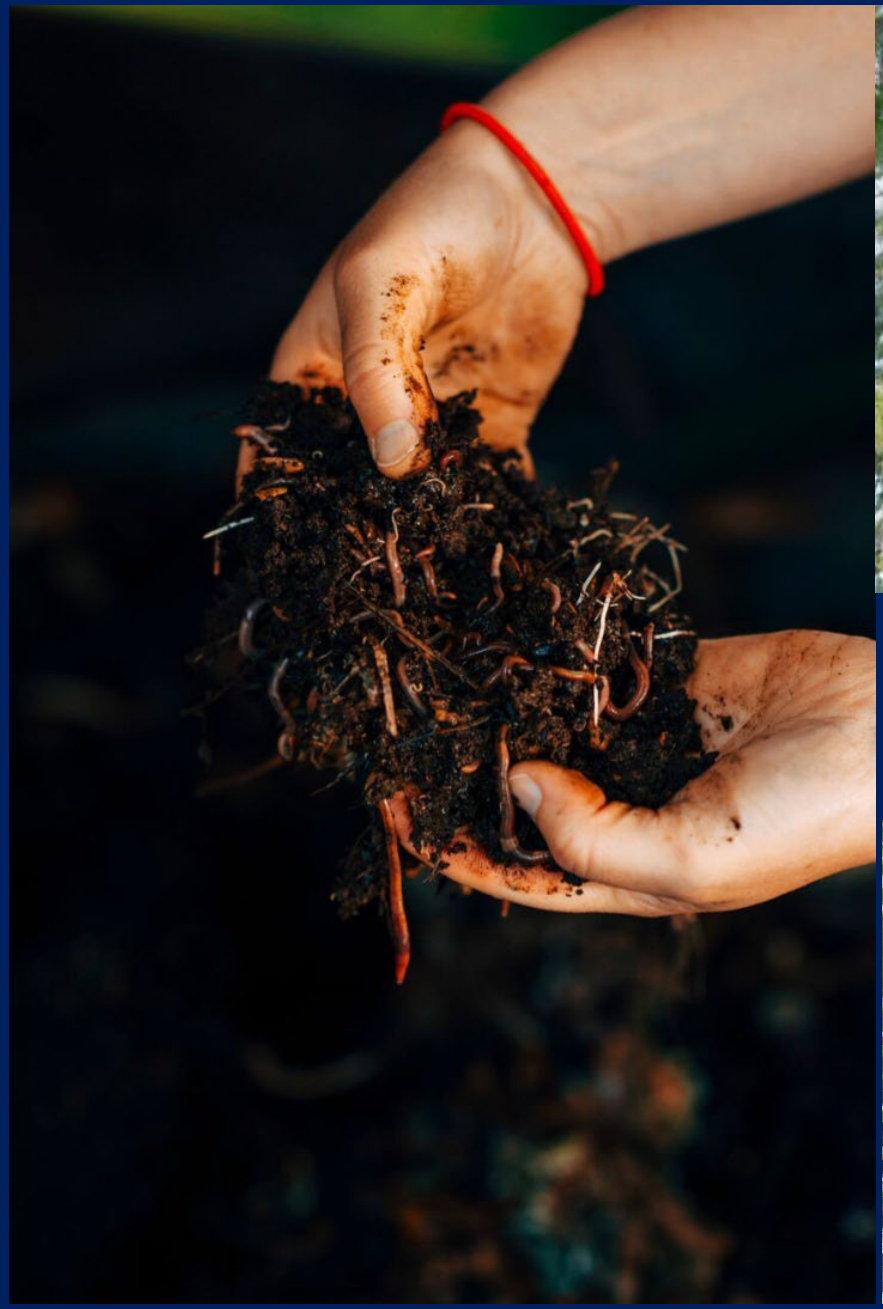
Eon	Era	Period	MYA	Emergence	Flourished	Oxygen	Climate	Continental drift
Phanerozoic	Cenozoic	Quaternary	2.6	chimpanzees *Homo sapiens*				
		Tertiary	65.5	hominins apes primates	mammals			
	Mesozoic	Cretaceous	145.5	angiosperms	dinosaurs angiosperms			
		Jurassic	200	placental mammals bird-like reptiles	gymnosperms			Pangaea rifts
		Triassic	251	mammals dinosaurs	ammonites			
	Paleozoic	Permian	299	basidiomycete fungi	trilobites (arthropoda) insects			
		Carboniferous	359	amniotes	seedless vascular plants			Pangaea forms
		Devonian	416	seed plants/plants with leaves tetrapods lichens and ferns vascular plants insects ascomycete fungi				
		Silurian	434	bony fish				
		Ordovician	488	mycorrhizal fungi cartilaginous fish land plants bryozoans	arthropods move to land			
		Cambrian	542	echinoderms arthropods mollusks vertebrates	arthropods			
Proterozoic			2500	multicellular animals multicellular algaes unicellular eukaryotes	multicellular marine organisms	banded iron formations		
Archaean			4000	cyanobacteria photosynthetic bacteria unicellular organisms				
Hadean			4600	earliest life traces (?)				

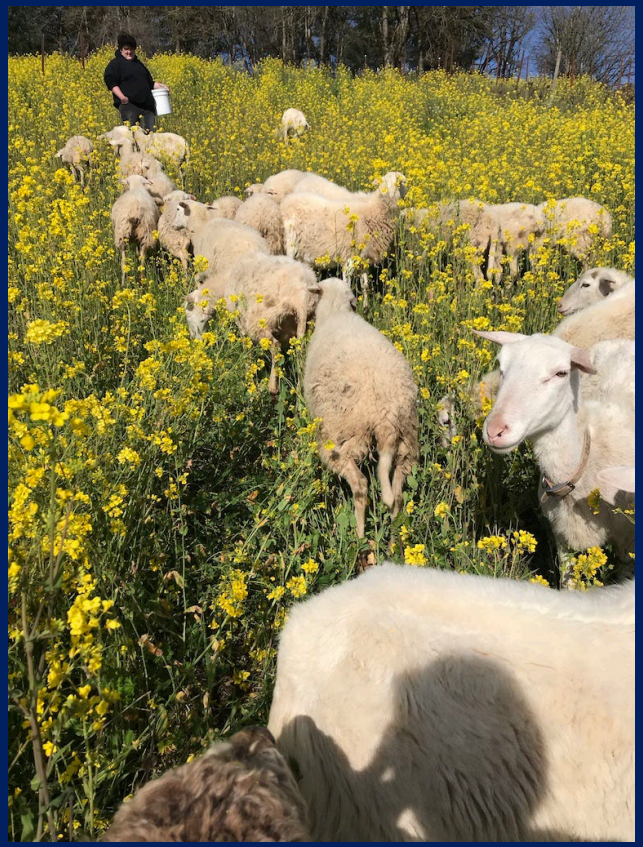


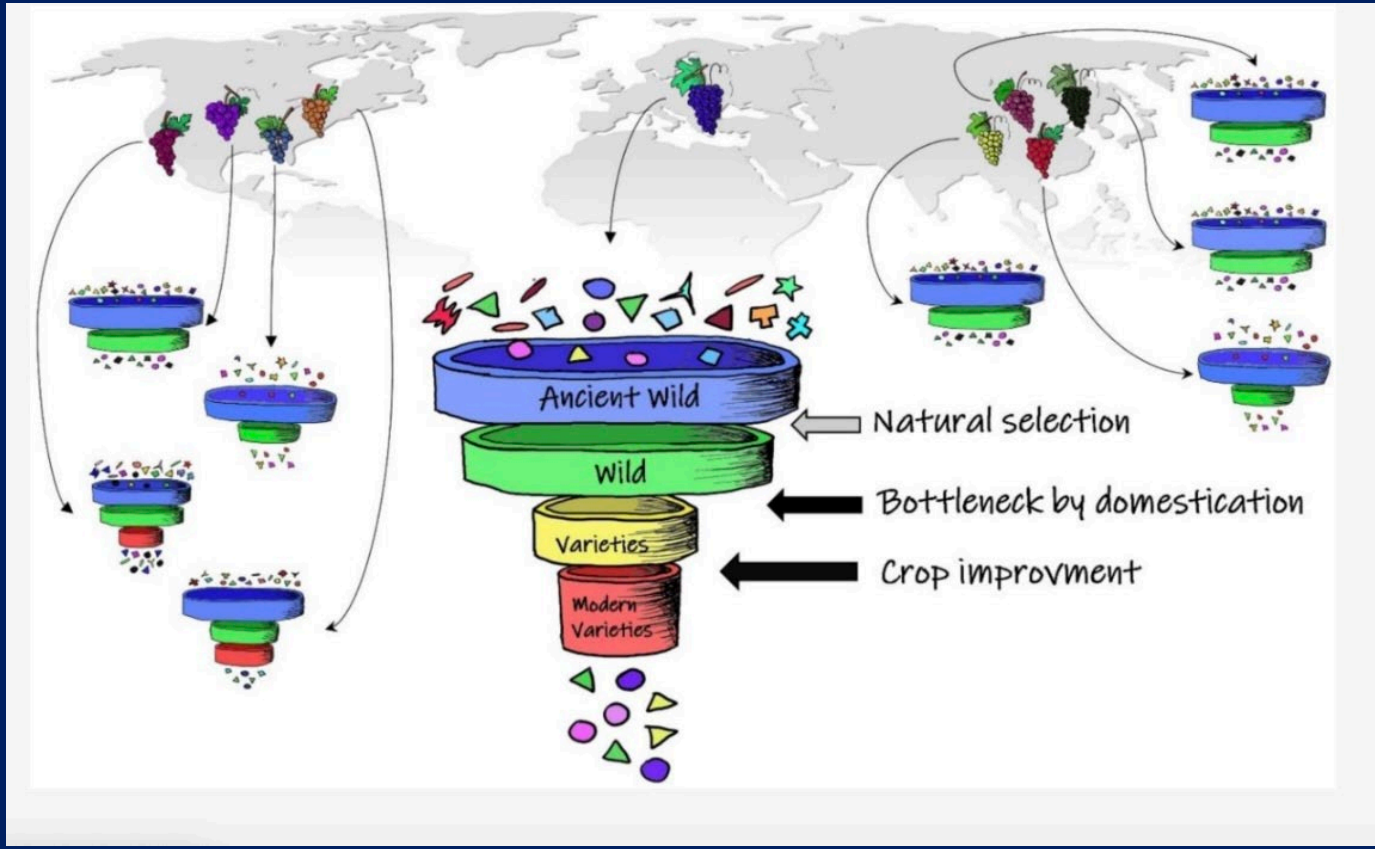


biopedogenesis









Grassi, F.; De Lorenzis, G. Back to the Origins: Background and Perspectives of Grapevine Domestication. *Int. J. Mol. Sci.* **2021**, *22*, 4518. https://doi.org/10.3390/ijms22094518

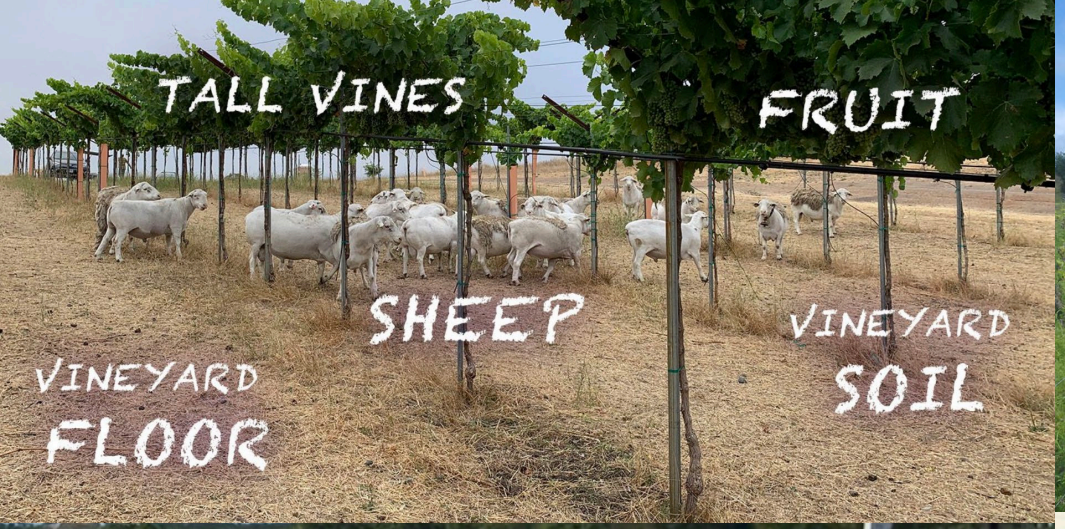

Heavy Harrow 24x15x6 T1



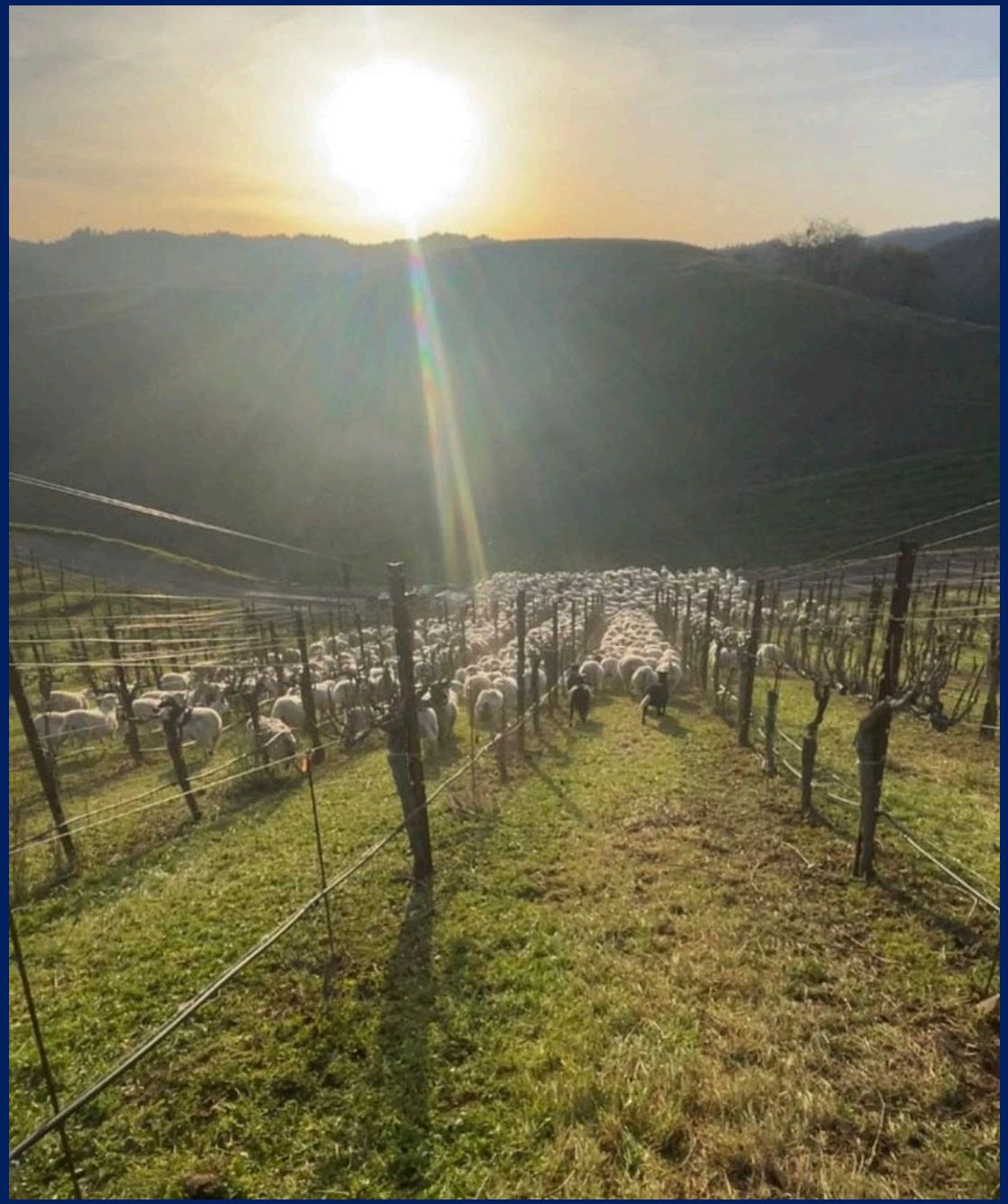








TALL VINES
FRUIT
SHEEP
VINEYARD
SOIL
VINEYARD
FLOOR


Lucerne




ThermoWorks
HOLD °F
150.1
92.6
°C/°F
Mode
Lock
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88.6
77.8
°C/°F
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