Le sommeil à travers les âges : les paradoxes du sommeil

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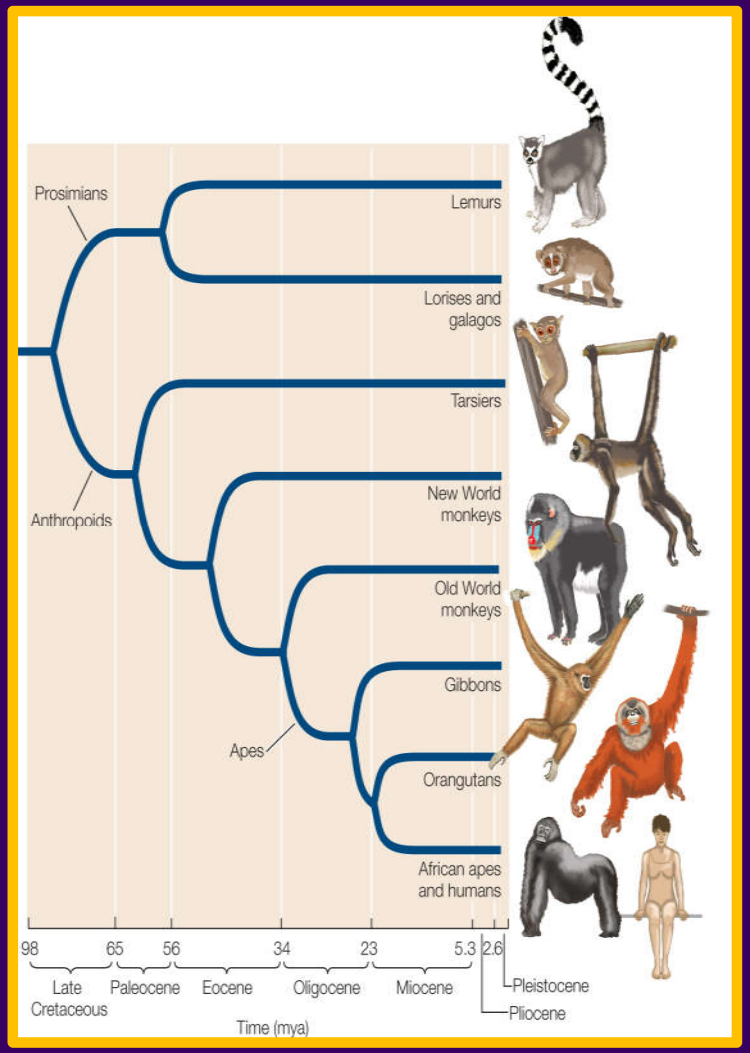
Congrès annuel SleepOnline
23 septembre 2023 au CFR Bouge – Namur

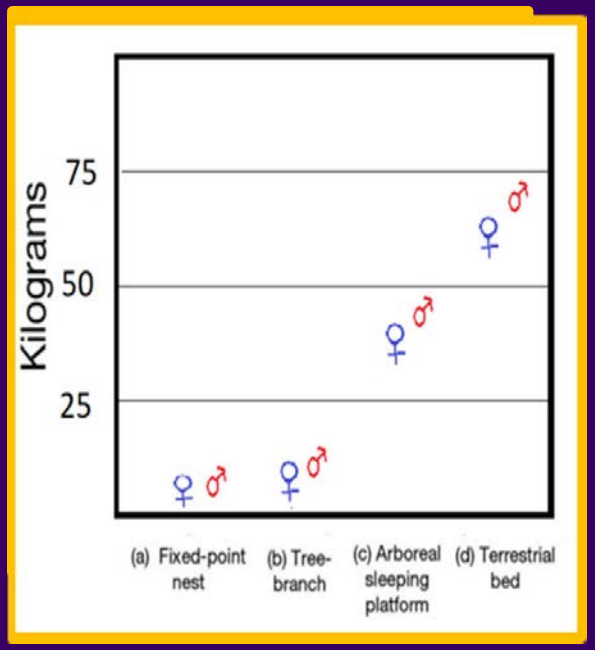
Primate Sleep in a Comparative Context

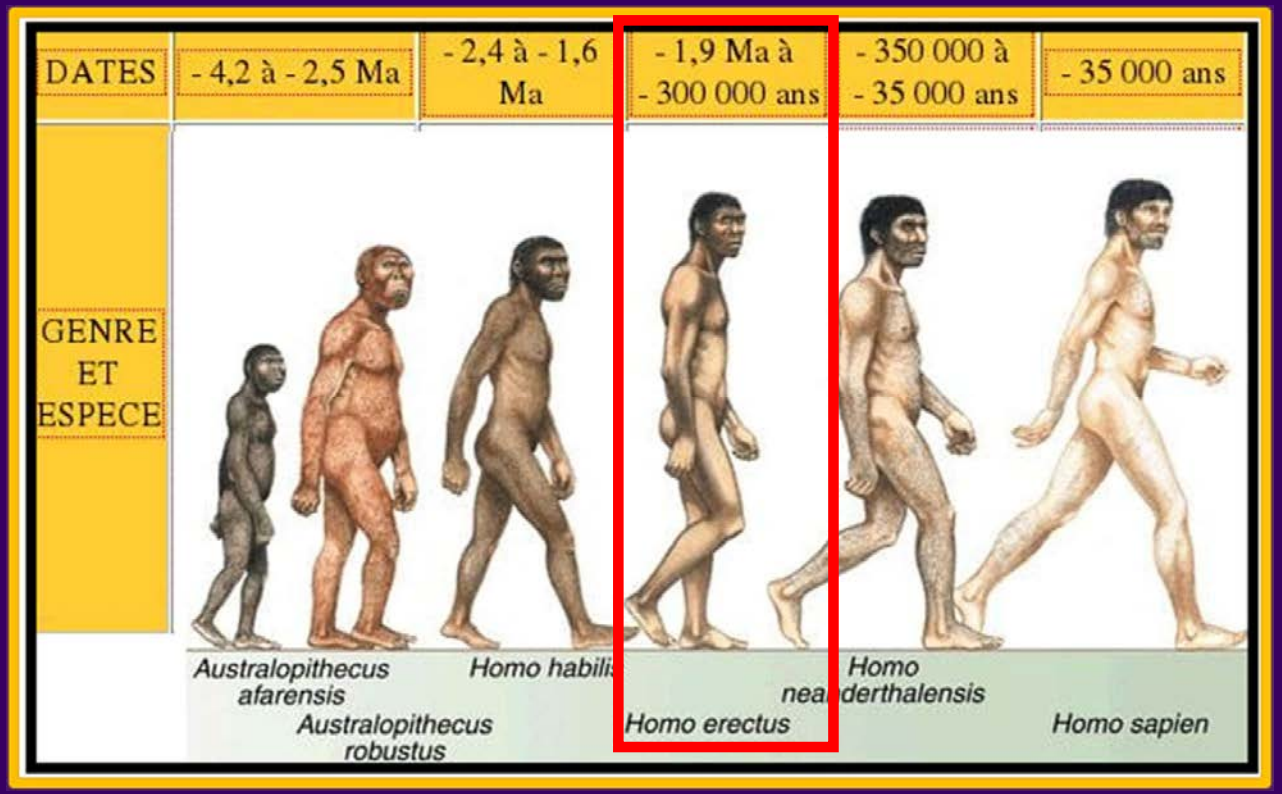


The ‘Sleep Quality Hypothesis’ Vs the ‘Engineering Hypothesis’

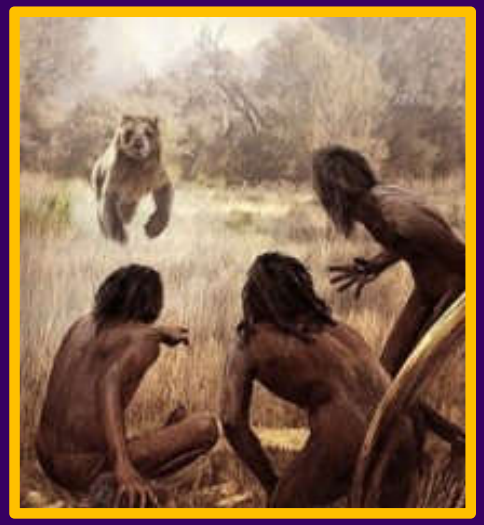
Orangutans (*Pongo Spp.*) Have Deeper, More Efficient Sleep than Baboons (*Papio papio*) in Captivity (2015)

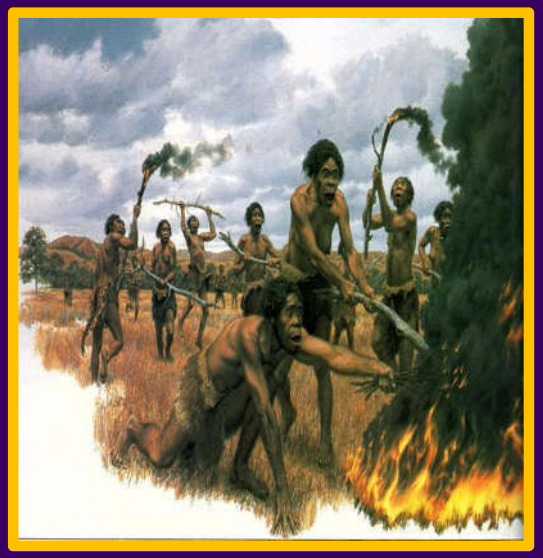
Primate Sleep in a Comparative Context

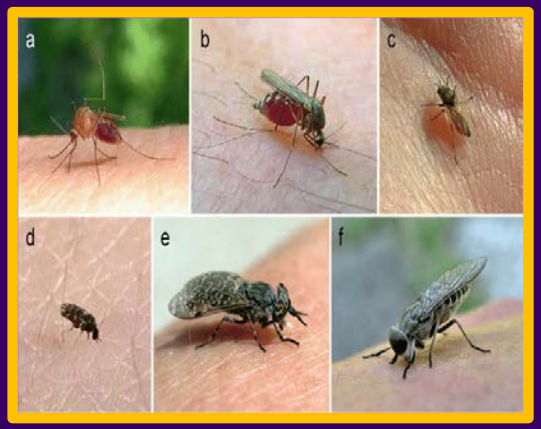




ECOLOGY OF SLEEP SITES







ECOLOGY OF SLEEP SITES

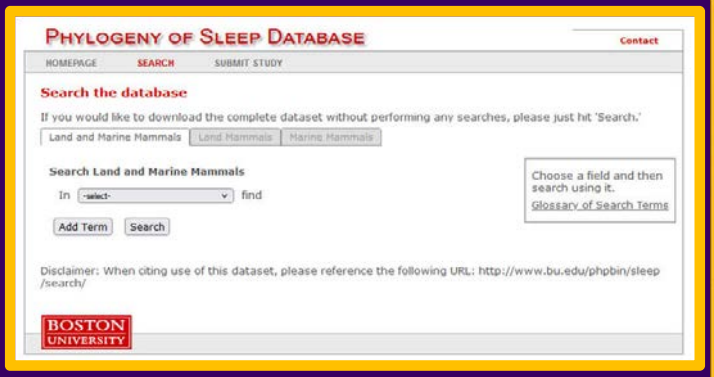
TABLE 1. Hominoid Sleep Ecology: Overview of Ape and Human Hunter-gatherer,

	Great ape	Hunter-gatherer
Chronology	18-14 mya to present	1.8 mya to present
Sleeping platform	Arboreal sleeping platforms made of foliage	Foliage, animal hide
Sleep group size[a]	5	26
Diurnal inactivity	Fluid	Fluid
Fire	Absent	Present
Security	Arboreal platforms, group size, insect repellant/odor masking properties of nests	Fire, group size, defensive structures, sentinels, males in prone position closest to potential threats, mother-infant co-sleeping
Thermoregulation	Sleep platform complexity, foliage; mother-infant co-sleeping	Fire, shelter, mother-infant co-sleeping, group sleep during temperature nadir

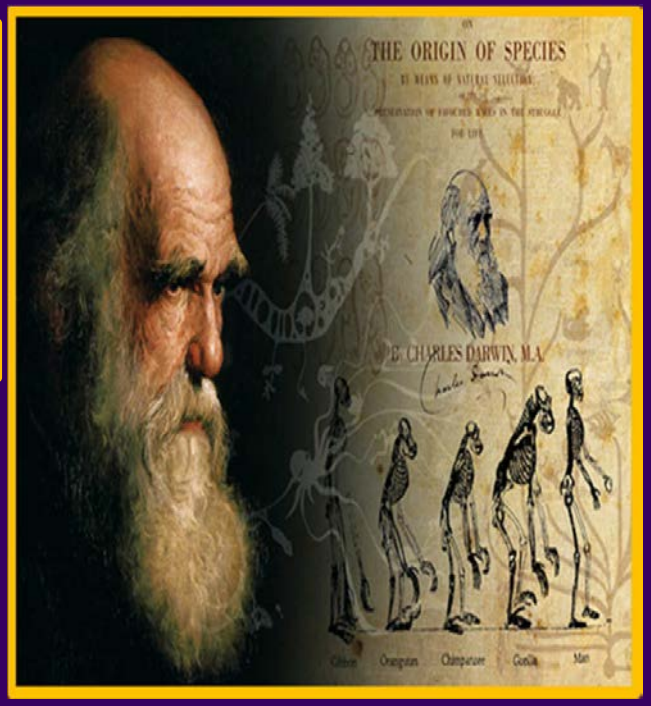
The Open Sleep Journal, 2008, *1*, 11-14

The Phylogeny of Sleep Database: A New Resource for Sleep Scientists

Patrick McNamara*[,1], Isabella Capellini[2], Erica Harris[1], Charles L. Nunn[3,4], Robert A. Barton[2] and Brian Preston[3]



Number of Papers	178
Number of Species with Sleep Data	127
Number of Families with Sleep Data	46
Number of Orders with Sleep Data	17
Number of Species with REM and NREM Sleep Data	73
Number of Species with Sleep Cycle Data	59



Recording Primate Sleep: Current Cost-Effective Technology That Can Expand Primate Sleep Datasets

Technology	Gross Measure	Specifics	Invasive
Actigraphy	Active/nonactive states	Can measure activity at 1-sec interval resolution; in humans, algorithms may generate NRME/REM states at 90% efficacy	No
Videography/ Eularian magnification	Behavioral signatures	Can measure respiration and gross body motor movement; in apes, shown to differentiate between NREM/REM states at 80% efficacy	No
Piezoelectric	Active/nonactive states	Automatically records data; can measure breathing rhythms	No
EEG	Gold standard "brain wave activity"	Automatically records data; can differentiate between NREM/REM states and measure delta and theta wave states	Yes

Species	TST	REM duration	NREM duration
Aotus trivirgatus	16.97	1.82	15.15
Callithrix jacchus	9.5	1.61	7.9
Chlorocebus aethiops	9.77	0.65	9.044
Erythrocebus patas	10.9	0.86	9.99
Eulemur coronatus	8.96		
Eulemur flavifrons	8.84		
Eulemur macaco	9.65	0.84	8.81
Eulemur mongoz	11.9	0.72	11.16
Homo sapiens	7	1.56	5.41
Lemur catta	11.05		
Macaca arctoides	9	1.38	7.65
Macaca fascicularis	10.46	1.71	8.74
Macaca mulatta	10.23	2.05	8.19
Macaca nemestrina	9.88	0.99	8.89
Macaca radiata	9.1	1.05	8.06
Macaca sylvanus	11.74	1.07	10.68
Microcebus murinus	15.36	0.99	14.37
Pan troglodytes	9.67	1.45	8.22
Papio anubis	9.84	1.39	8.45
Papio hamadryas	9.83	1.27	8.61
Papio papio	10.07	1.06	9.01
Perodicticus potto	11		
Phaner furcifer	11.5		
Pongo pygmaeus	9.11	1.11	8
Propithecus coquereli	10.63		
Saguinus oedipus	13.18		
Saimiri sciureus	9.72	1.77	7.8
Theropithecus gelada	10.91		
Varecia rubra	9.81		
Varecia variegata	10.9		

RESEARCH ARTICLE

WILEY
18 January 2018

American Journal of PHYSICAL ANTHROPOLOGY

Sleep in a comparative context: Investigating how human sleep differs from sleep in other primates

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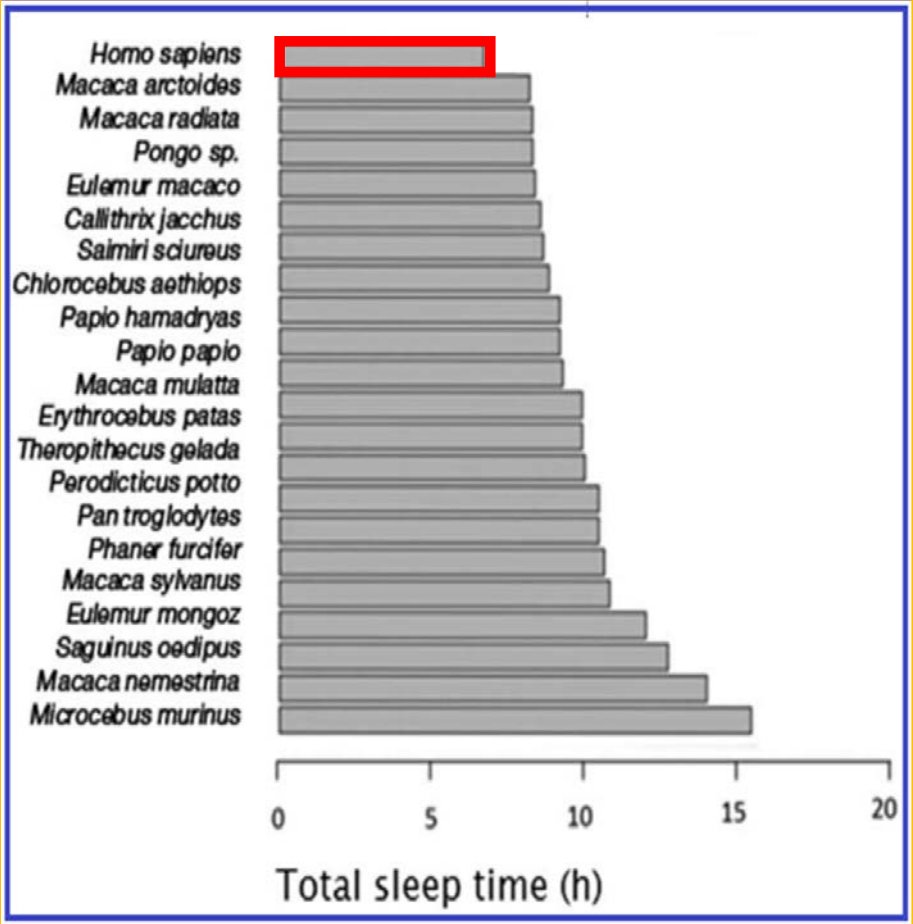
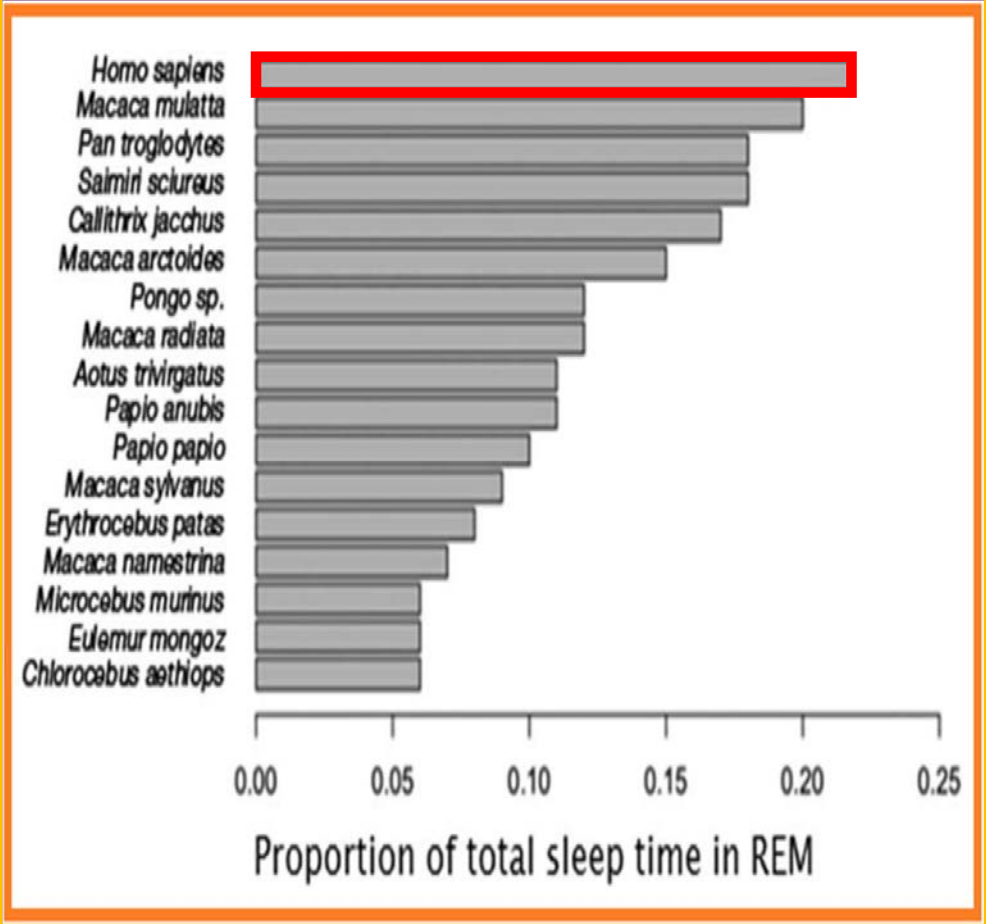


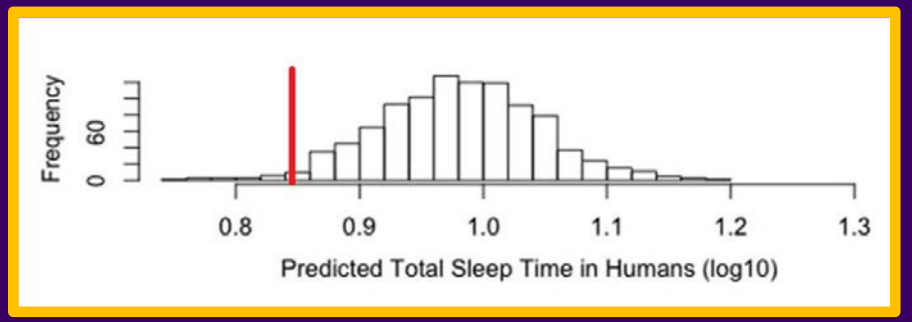


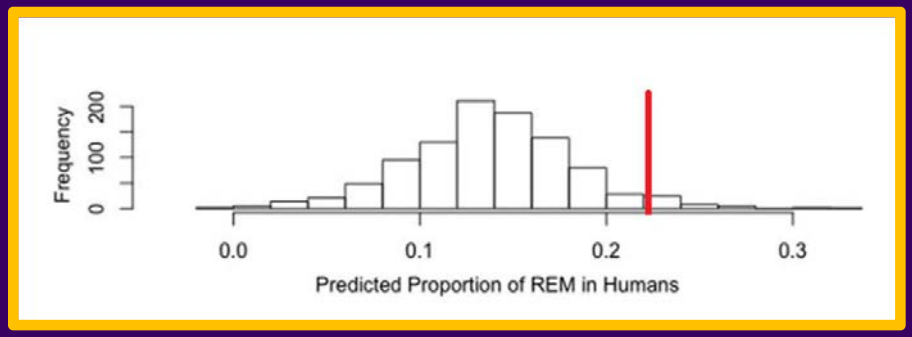
Phylogenetic generalized least squares (PGLS)

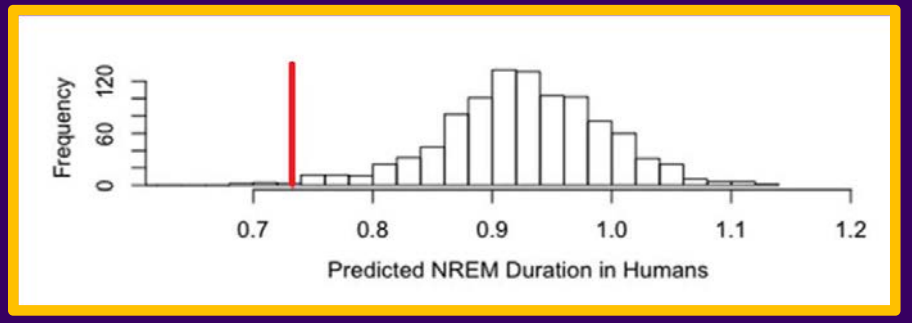
- To Predict sleep characteristics involving TST, proportion of REM, and the durations of NREM and REM

- Dietary variables
- Body mass
- Day journey length
- Open or terrestrial habitat
- Activity period,
- Interbirth interval
- Endocranial volume
- Sexual size dimorphism
- Group size

Multistate Onrstein-Uhlenbeck (OU) evolutionary model of random drift







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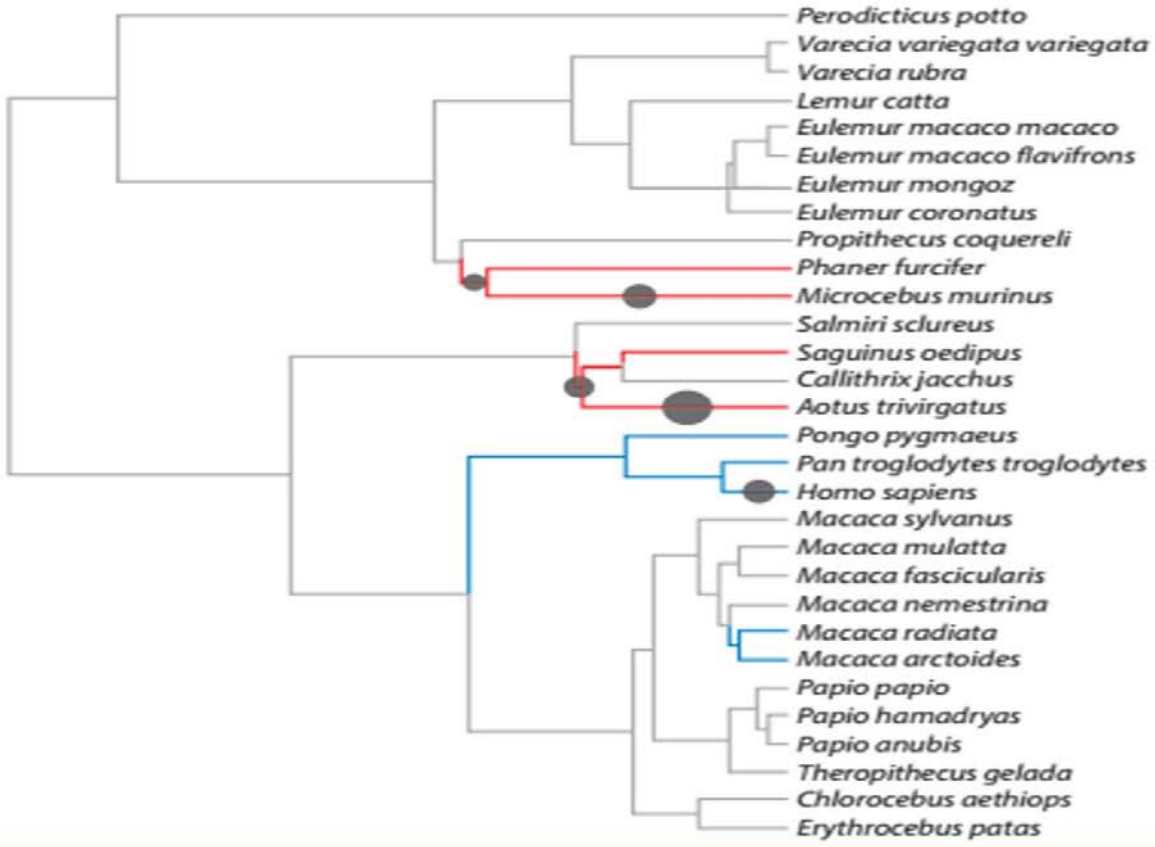
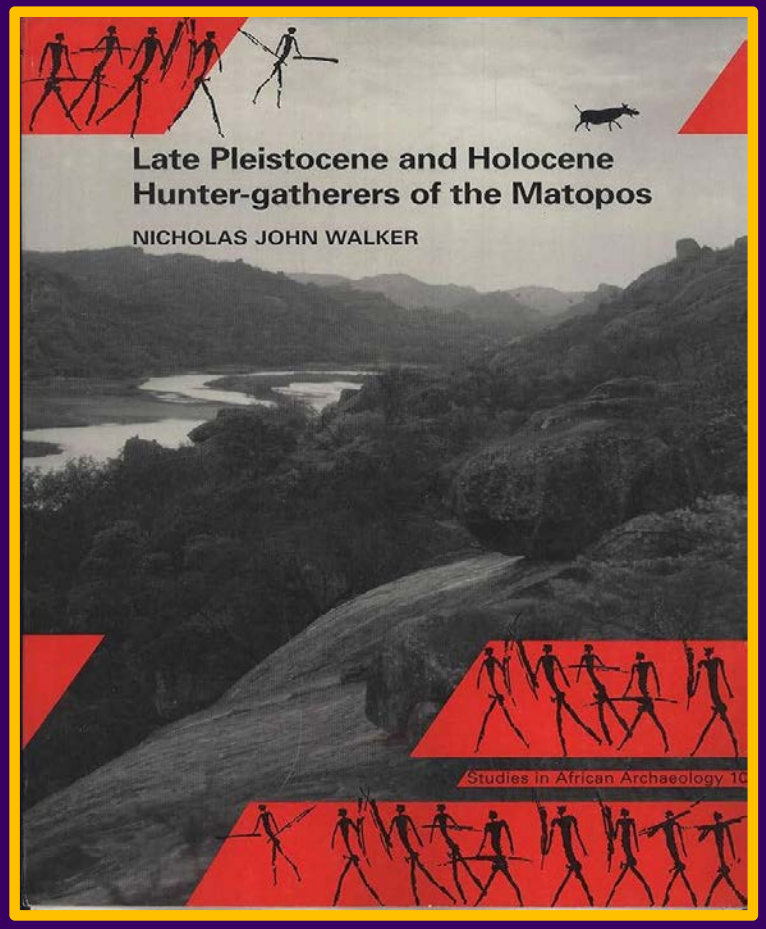
Sleep in a comparative context: Investigating how human sleep differs from sleep in other primates



WHAT IS NATURAL HUMAN SLEEP?



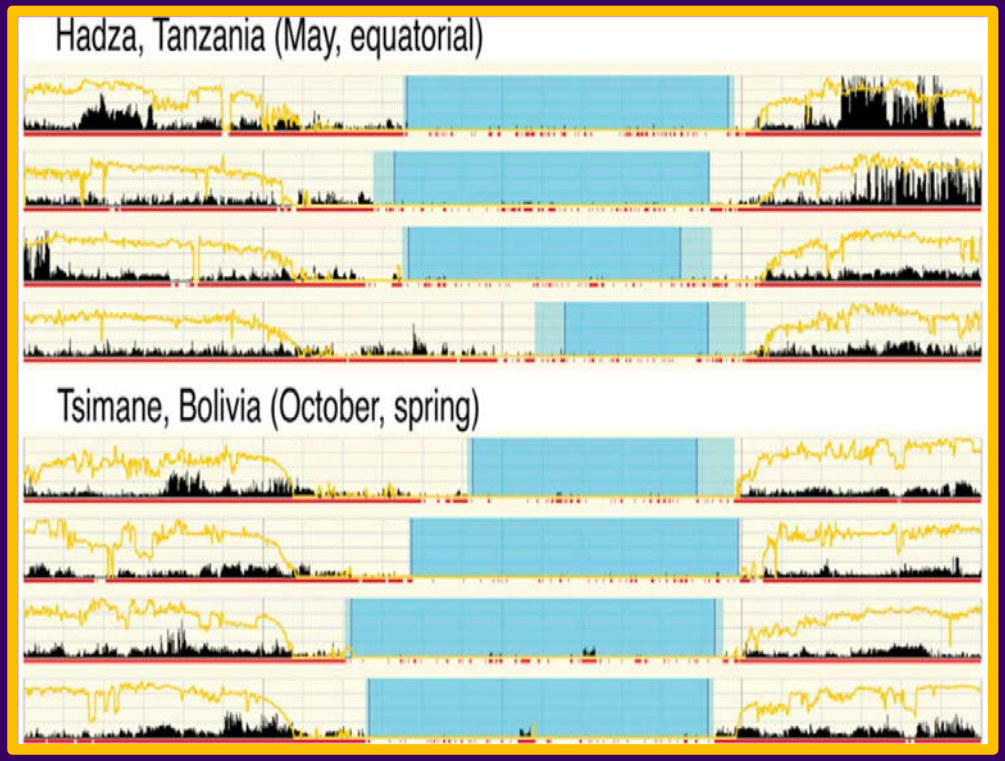
Report

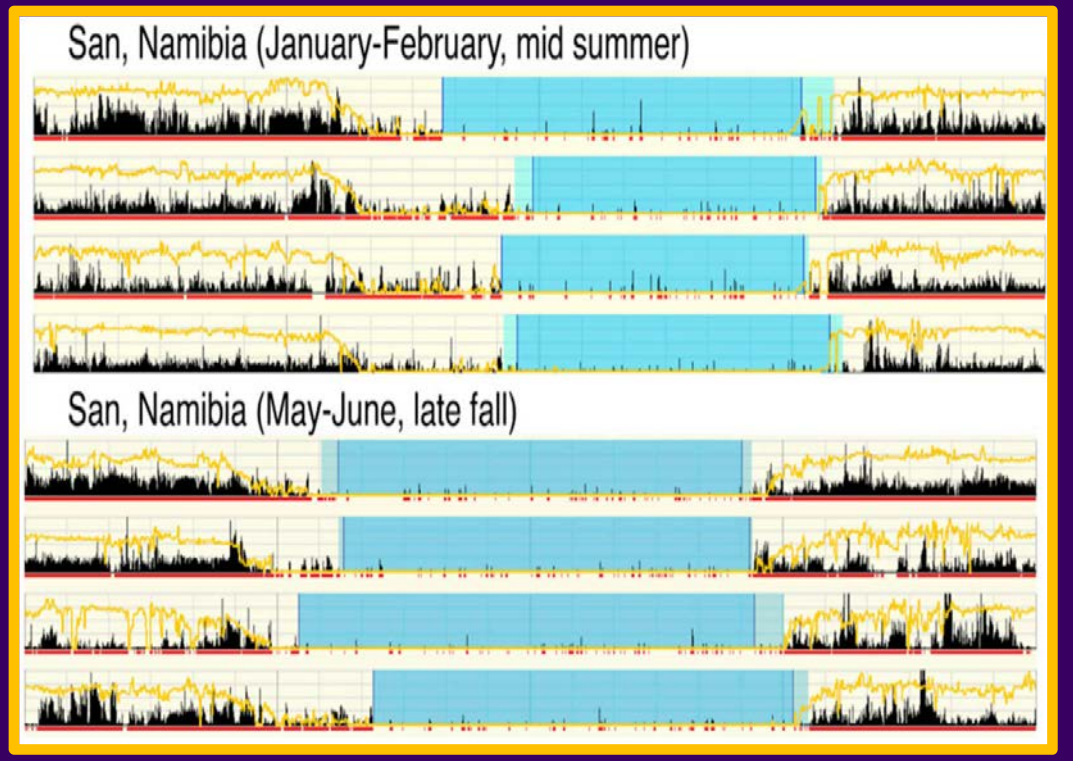
Current Biology

Natural Sleep and Its Seasonal Variations in Three Pre-industrial Societies

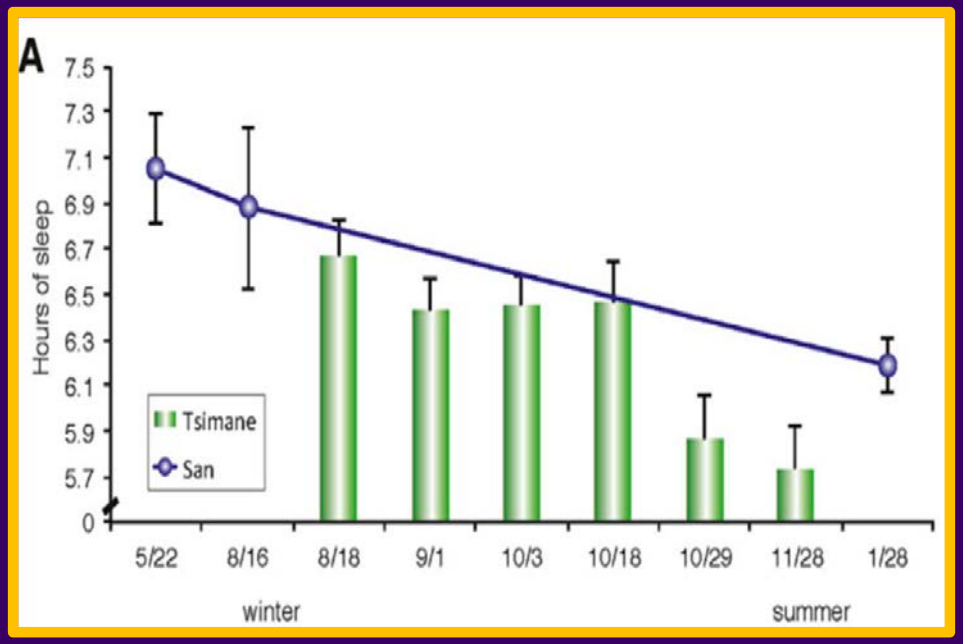
4S: Small Scale Subsistence Society

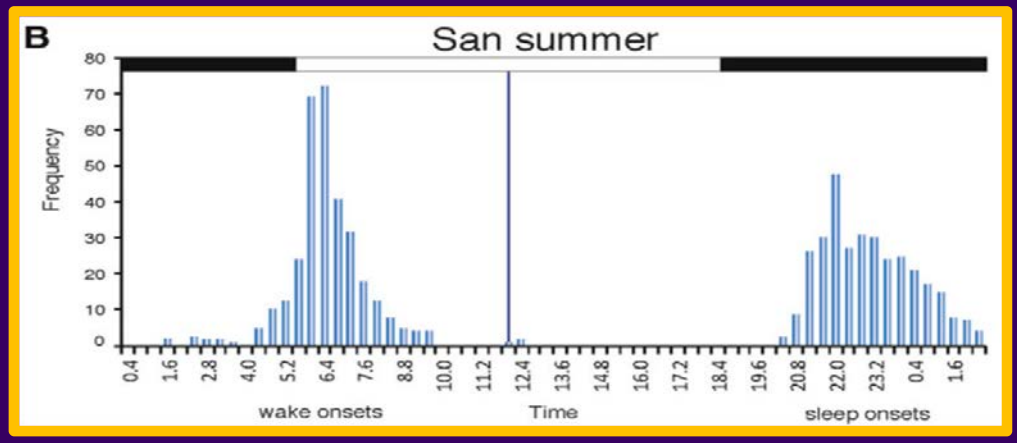
SLEEP DURATION

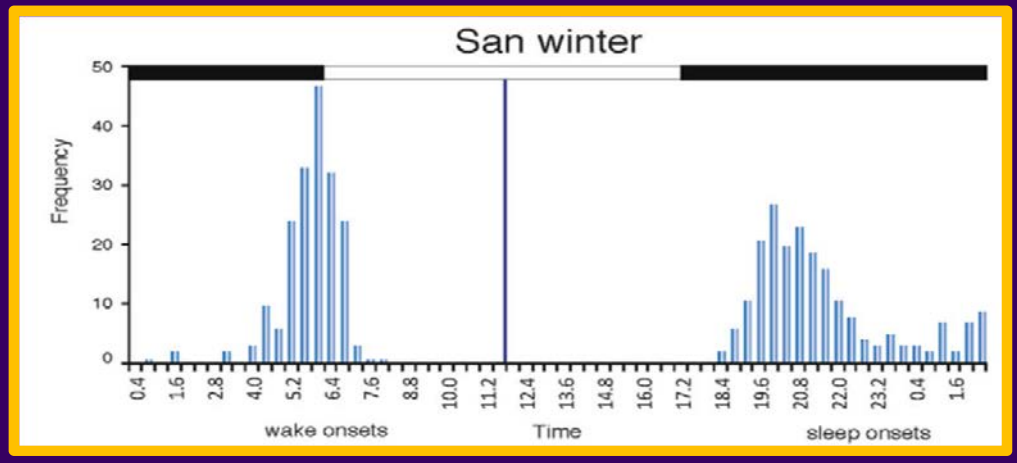




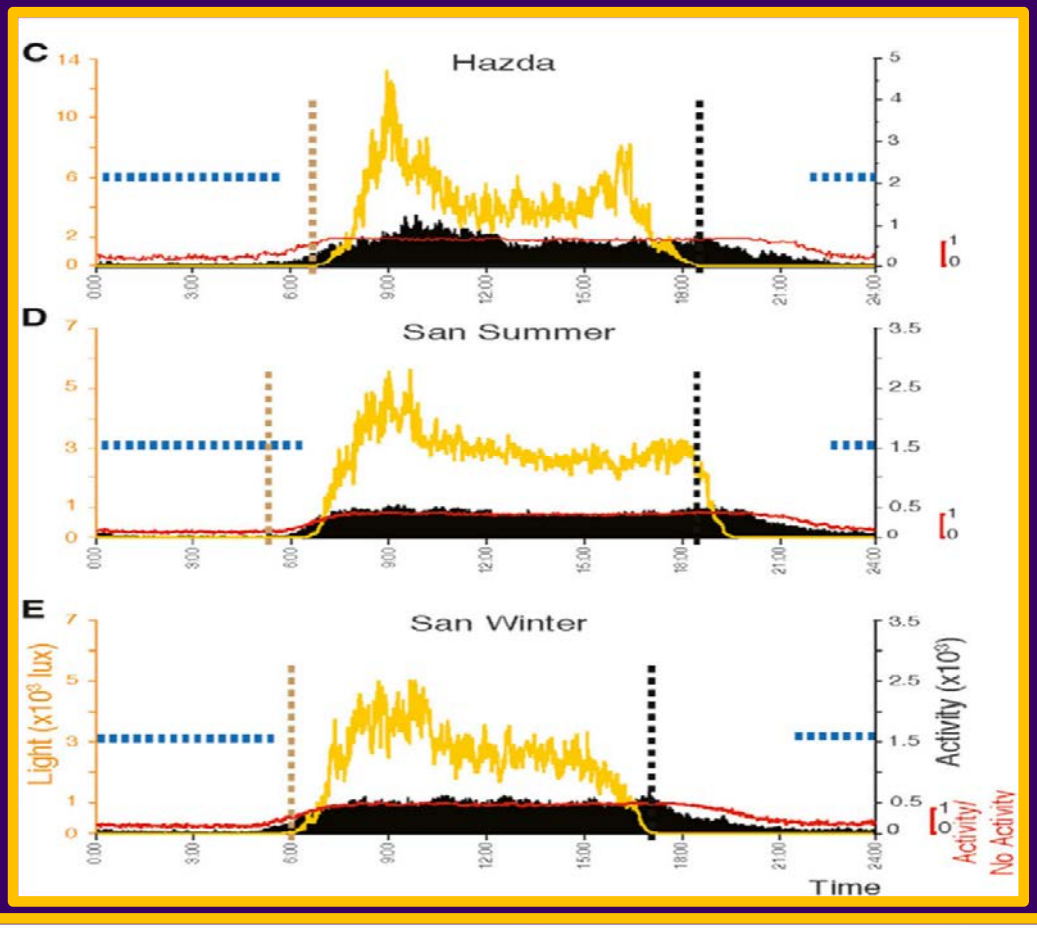
Seasonal Effects on Sleep



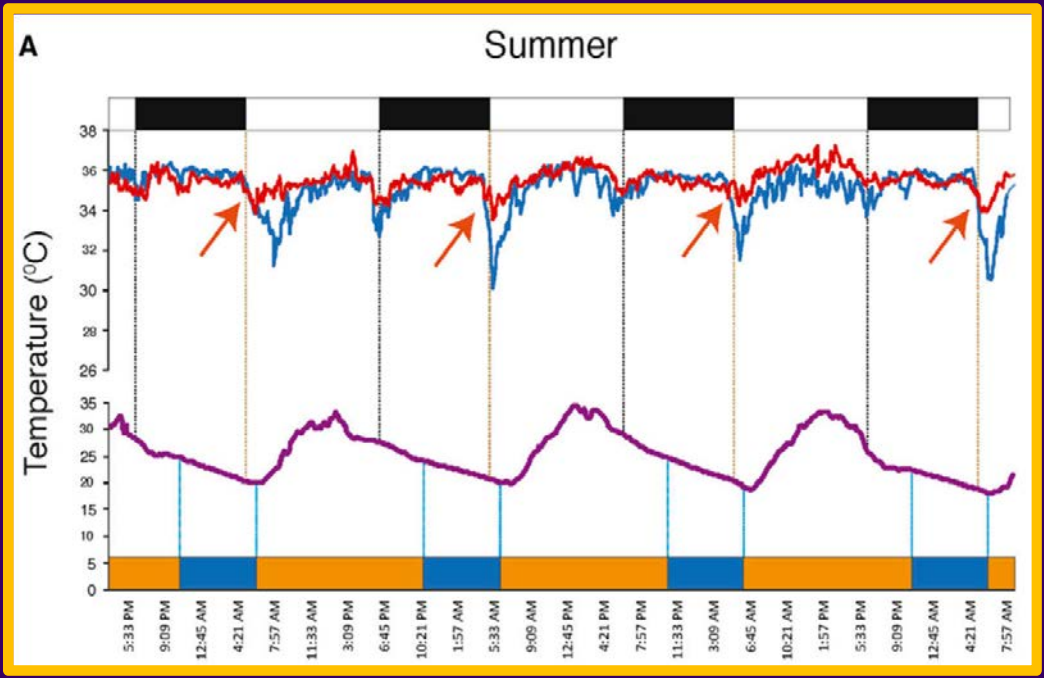


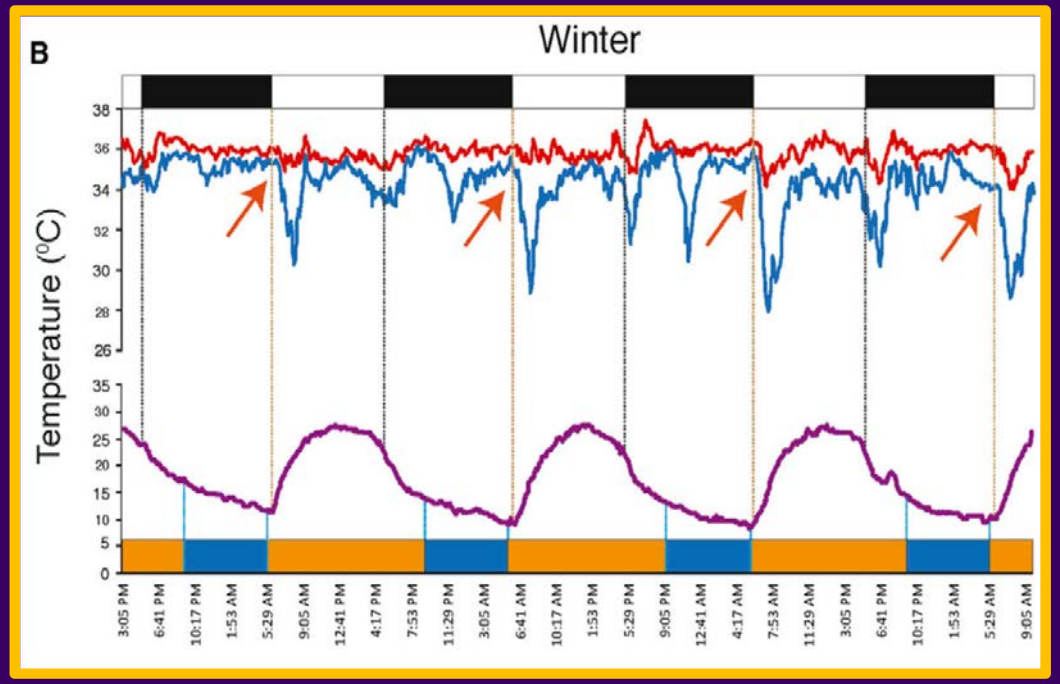


Light and Activity Plots



Relation of Sleep to Ambient Temperature and Skin Temperature





Violet lines, environmental temperature; red lines, abdominal temperature; and blue lines, finger temperature
Black bars, night; orange bars, awaking; and blue bars, sleep.

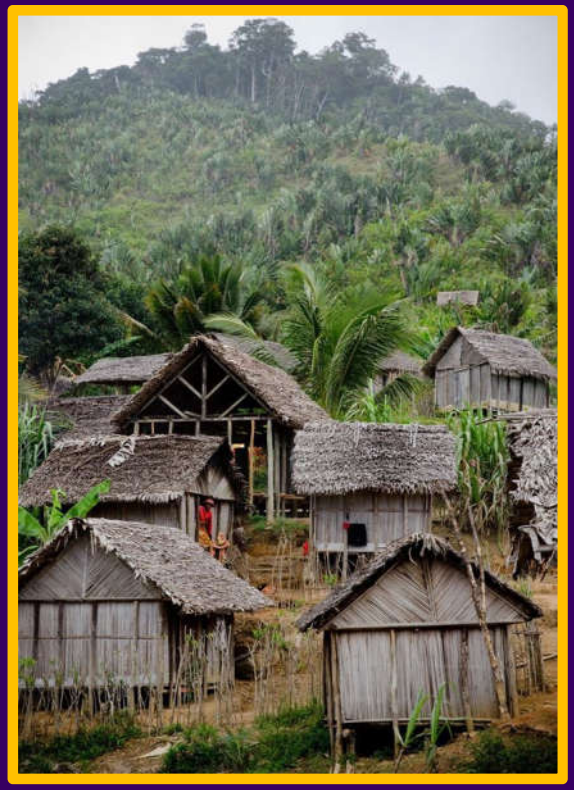
ORIGINAL RESEARCH ARTICLE

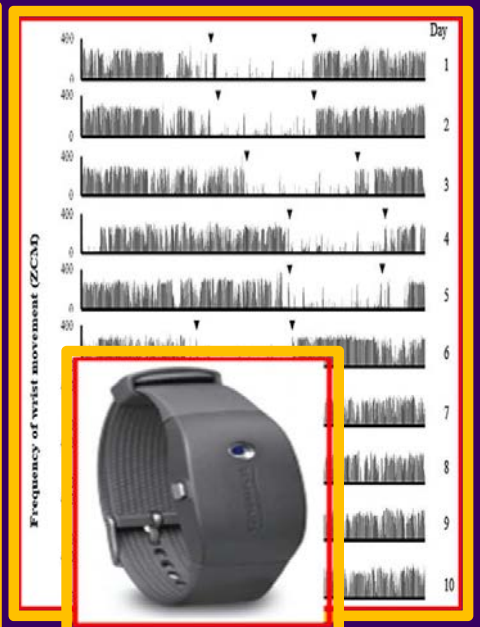
American Journal of Human Biology

Segmented sleep in a nonelectric, small-scale agricultural society in Madagascar

TABLE 1 Study sample characteristics for full sample by sex

Sleep–wake measure	Men	Women
Sleep onset	19:26 (3:21)	19:37 (3:58)
Sleep end	05:44 (0:39)	5:26 (1:04)
Sleep latency (h)	0.63 (1.48)	0.43 (0.47)
Time in bed (h)	9.5 (1.8)	9.3 (1.5)
Sleep duration (h)	6.6 (1.3)	6.5 (1.8)
Wake after sleep onset (h)	2.1 (0.99)	2.15 (0.79)
Sleep efficiency (%)	69.6 (13.9)	70.4 (9.7)
Sleep fragmentation	43.6 (16.7)	38.9 (10.9)
Cumulative night-time activity ☆	13911 (7774)	11167 (7317)





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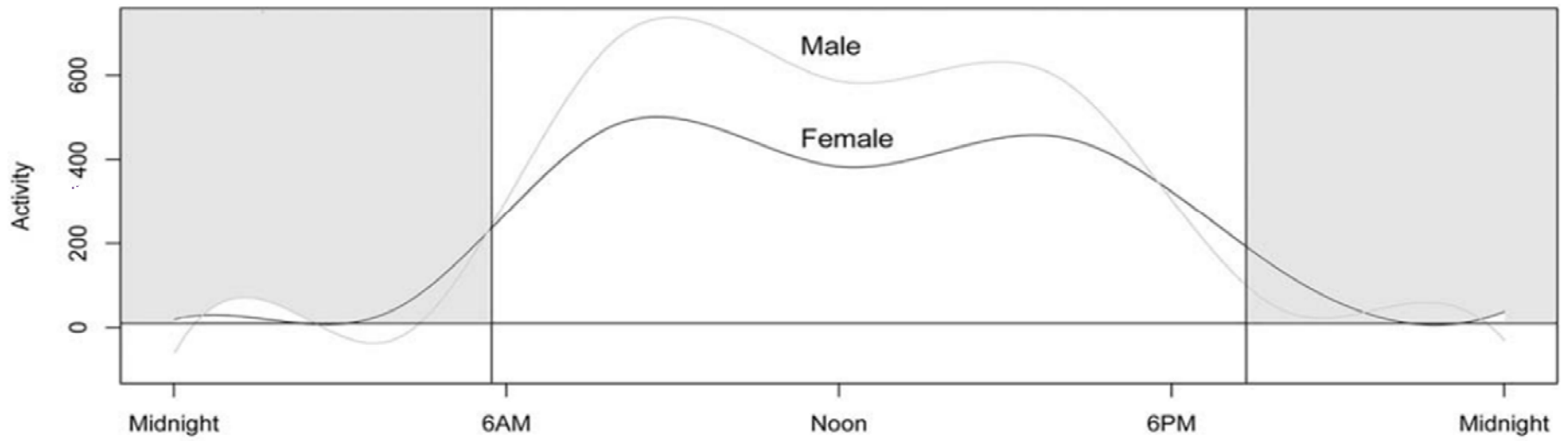

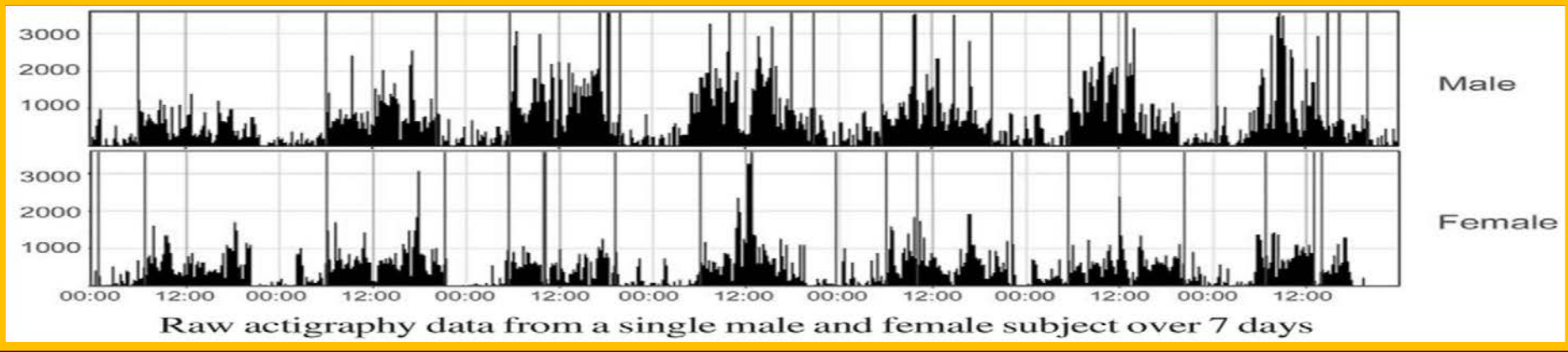

Raw actigraphy data from a single male and female subject over 7 days

ORIGINAL RESEARCH ARTICLE

American Journal of Human Biology

Segmented sleep in a nonelectric, small-scale agricultural society in Madagascar

TABLE 2 Sleep quantified by actigraphy compared between subjects in Mandena, Madagascar ($n = 21$) and postindustrial samples with healthy, normal shift-working subjects[a]

Sleep quota	Malagasy	Italy	USA
Sleep onset	19:21 (3:38)	00:03 (1:59) ☆	N/A
Sleep end	05:44 (0:53)	08:13 (1:19) ☆	N/A
Time in bed (hour)	9.4 (1.6)	8.1 (1.02) ☆	N/A
Sleep latency (hour)	0.55 (1.15)	0.16 (0.09) ☆	N/A
Sleep duration (hour)	6.5 (1.6)	7.60 (0.96) ☆	7.02 (1.05)
Wake after sleep onset (hour)	2.1 (0.9)	0.31 (0.22) ☆	0.71 (0.34) ☆
Sleep efficiency (%)	70.7 (12.2)	94.2 (3.1) ☆	89.9 (4.6) ☆
Sleep fragmentation	45.9 (16.4)	N/A	20.0 (7.7) ☆

ORIGINAL RESEARCH ARTICLE

American Journal of Human Biology

Segmented sleep in a nonelectric, small-scale agricultural society in Madagascar

Nonparametric Circadian Rhythm Analysis (NPCRA) comparing Malagasy and Rock et al. (2014) postindustrial sample

Parameter	Malagasy	Postindustrial	Significance	Definitions
Interdaily stability	0.51 (0.08)	0.44 (0.09)	$t = 2.09$, $p = 0.045$	Degree of resemblance between the activity patterns on individual days; ranges from 0 to 1 and may typically be about 0.6 for healthy adults
Interdaily variability	0.67 (0.16)	0.99 (0.19)	$t = -4.60$, $p < 0.001$	Quantifies the fragmentation of periods of rest and activity; ranges from 0 to 2 and typically is <1 for healthy adults, with higher values indicating a more fragmented rhythm

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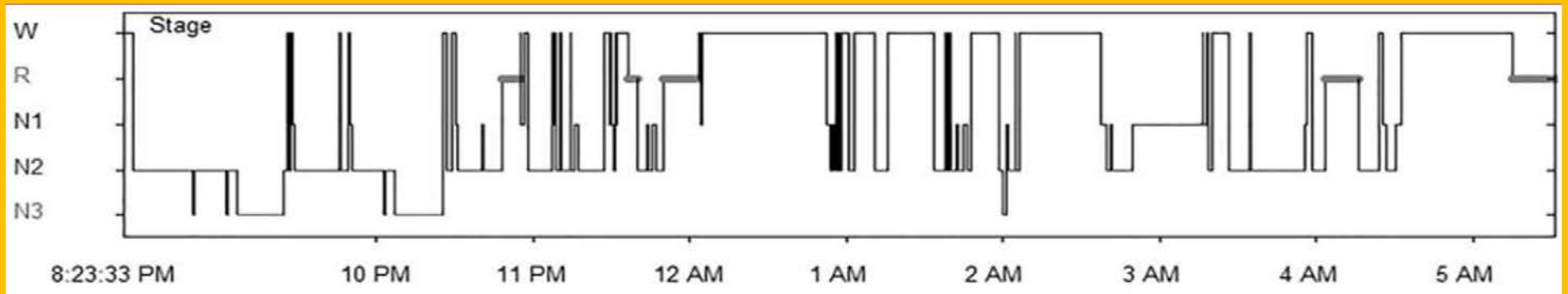
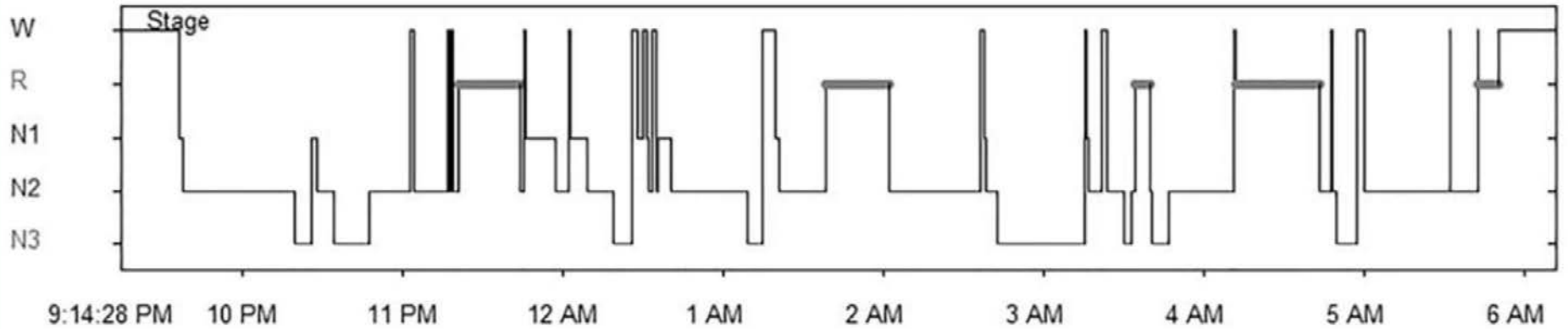


Male night 2



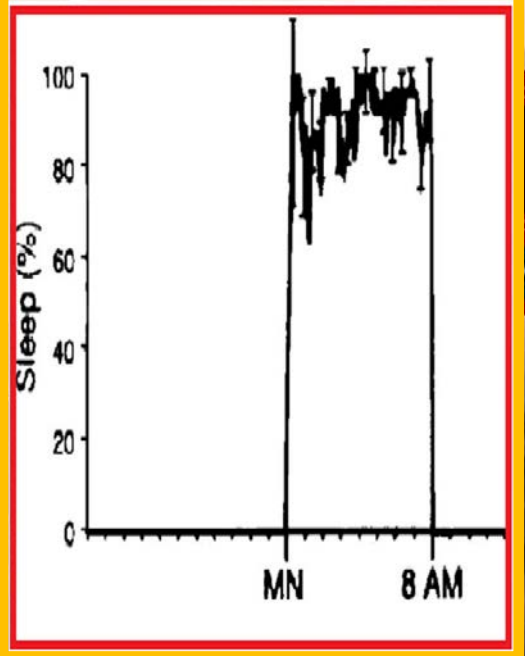
Female night 2

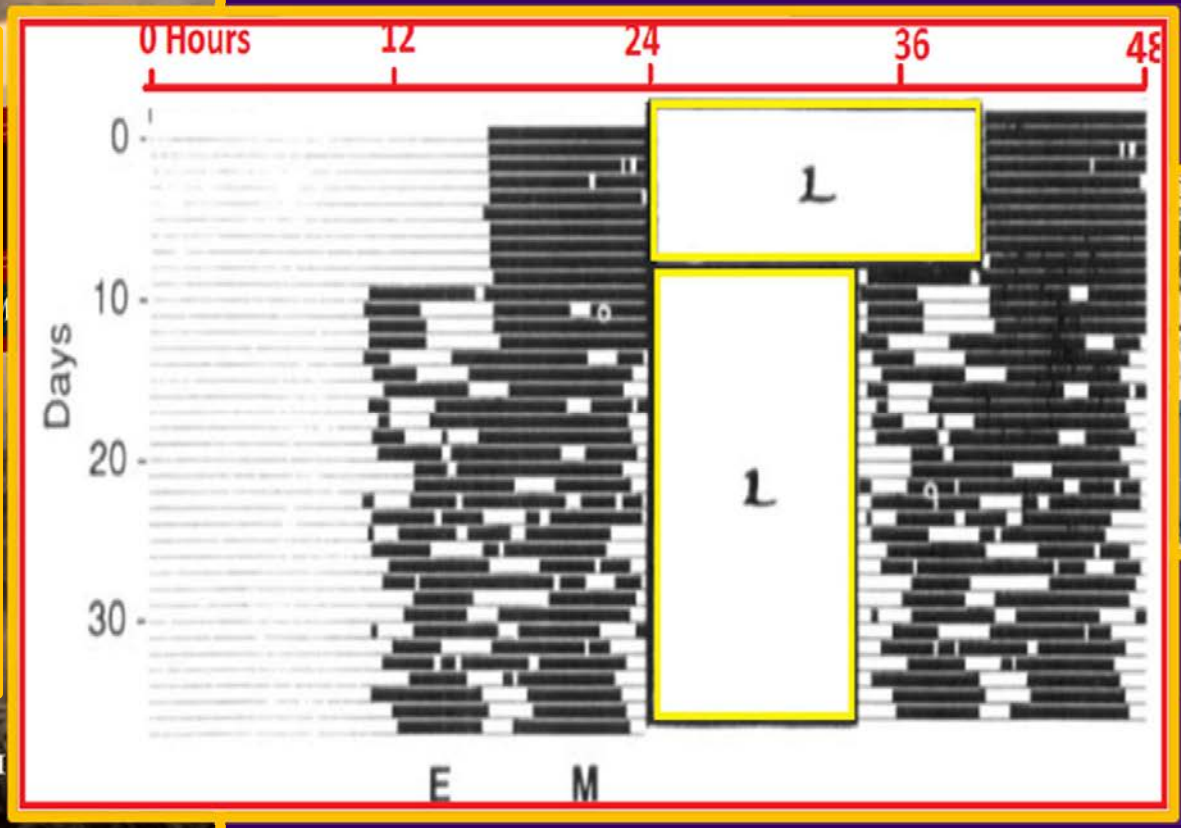
	Hunter-gatherer	Post-industrial
Chronology	1.8 mya to present	Nineteenth century to present
Sleeping platform	Foliage, animal hide	Padded bed, profuse sleeping accoutrements
Sleep group size[a]	26	1-2
Diurnal inactivity	Fluid	Rigid
Fire	Present	Absent
Sleep onset	Fluid	Scheduled
Wake onset	Rigid (sunrise)	Scheduled
Lux	Fire, moonlight	Artificially controlled
Acoustics	Fire ambient noise; dynamic (fauna, group members)	Silent, environmentally buffered
Security	Fire, group size, defensive structures, sentinels, males in prone position closest to potential threats, mother-infant co-sleeping	Environmentally buffered through complex domicile construction
Thermoregulation	Fire, shelter, mother-infant co-sleeping, group sleep during temperature nadir	Closed domicile, temperature regulation via blankets and modification of ambient temperature.

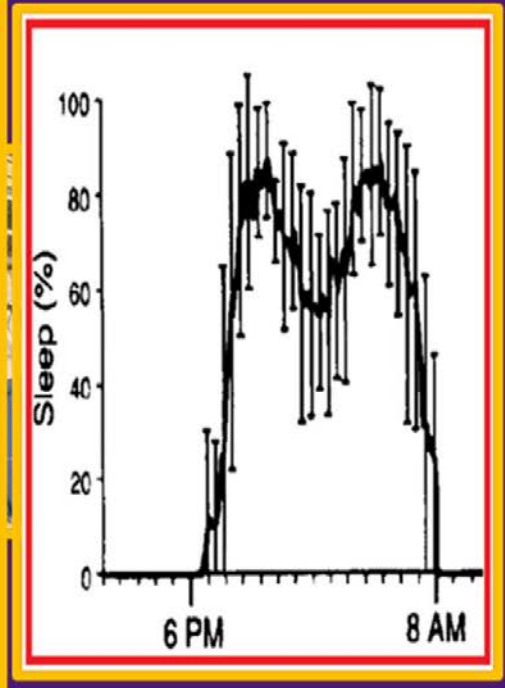
In short photoperiods, human sleep is biphasic

THOMAS A. WEHR

J. Sleep Res. (1992) **1**, 103–107







DAVID R. SAMSON AND CHARLES L. NUNN Evolutionary Anthropology 24:225–237 (2015)

ARTICLE

Sleep Intensity and the Evolution of Human Cognition