

MAthesis

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Time bins (stratigraphic stages)

Table 1: Smaller time bins with age range, epoch name, mean age and corresponding sample sizes (on individual, species and genus level)

bin	EpochBins	Stages	MeanBins	nIndividuals	nSpecies	nGenera
(0,0.0117]	Modern	Modern	0.00585	254	66	18
(0.0117,0.126]	Upper Pleistocene	Upper Pleistocene	0.06885	50	18	8
(0.126,0.781]	Middle Pleistocene	Middle Pleistocene	0.45350	53	13	7
(0.781,1.81]	Lower Pleistocene	Lower Pleistocene	1.29350	57	27	12
(1.81,2.59]	Gelasian	Lower Pleistocene	2.19700	33	15	9
(2.59,3.6]	Piacencian	Upper Pliocene	3.09400	24	15	10
(3.6,5.33]	Zanclean	Lower Pliocene	4.46600	31	17	8
(5.33,7.25]	Messinian	Upper Miocene	6.28900	12	9	6
(7.25,11.6]	Tortonian	Upper Miocene	9.42700	46	20	9
(11.6,13.8]	Serravallian	Middle Miocene	12.71400	27	8	6
(13.8,16]	Langhian	Middle Miocene	14.89500	18	14	9
(16,23]	Burdigalian/Aquitania	Lower Miocene	19.50000	31	15	9

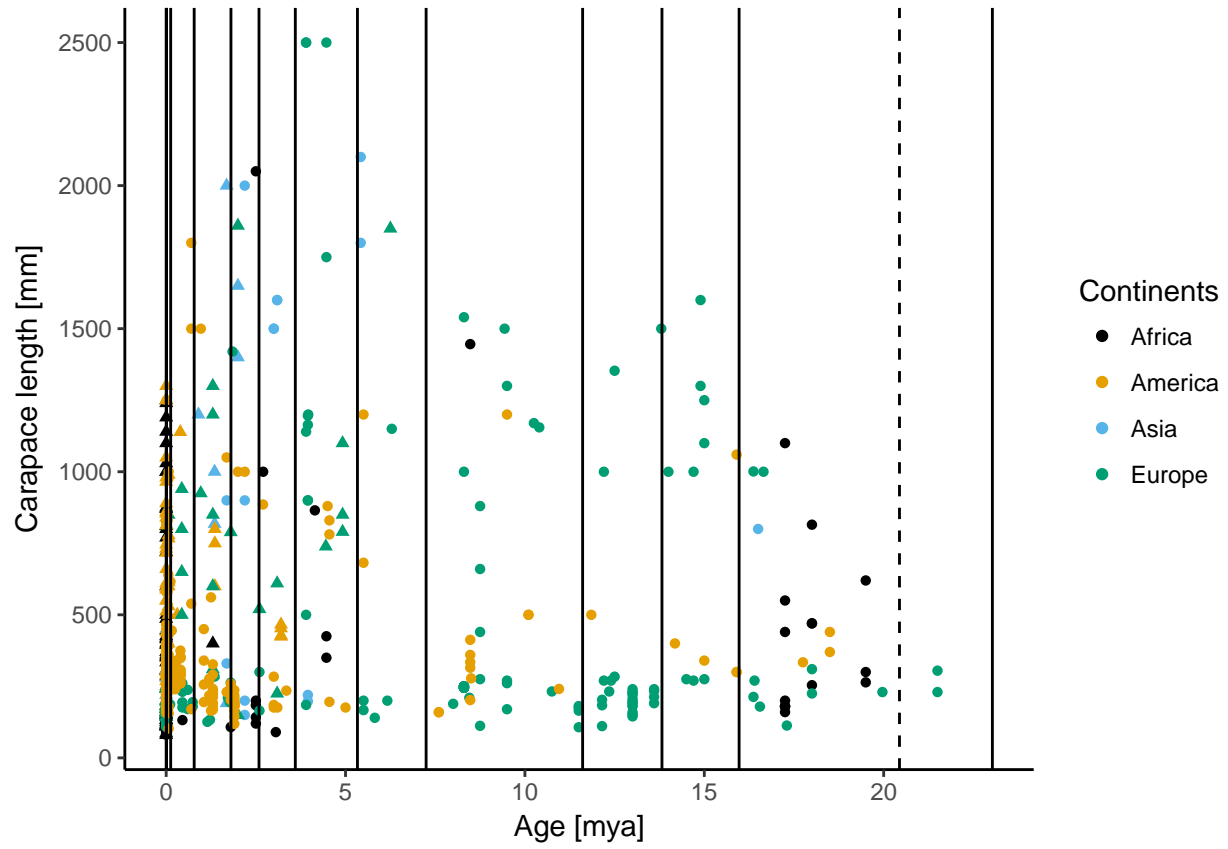


Figure 1: Scatterplot of carapace length over time, indicating insular (triangle) and continental (circles) and colour indicating continents. Lines indicate stratigraphic stages which were used as time bins, the dashed line is the border between the two stages of the Lower Miocene, which were considered as one time bin.

Maps

fossil occurrences of testudinidae

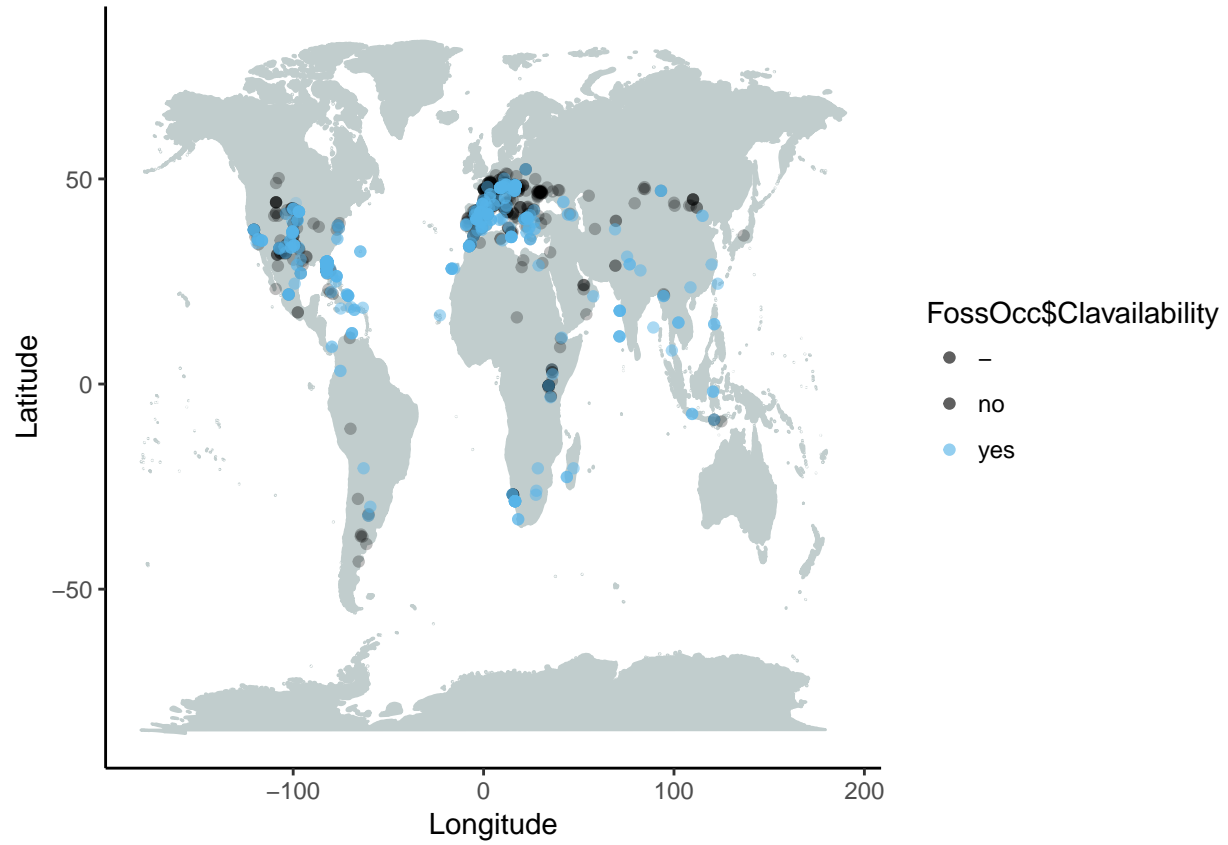


Figure 2: Map displaying all fossil occurrences of testudinids, with color indicating whether relevant literature was available (black if not) and if it was, whether body size data was available or not (yes and no, respectively).

body size of testudinidae

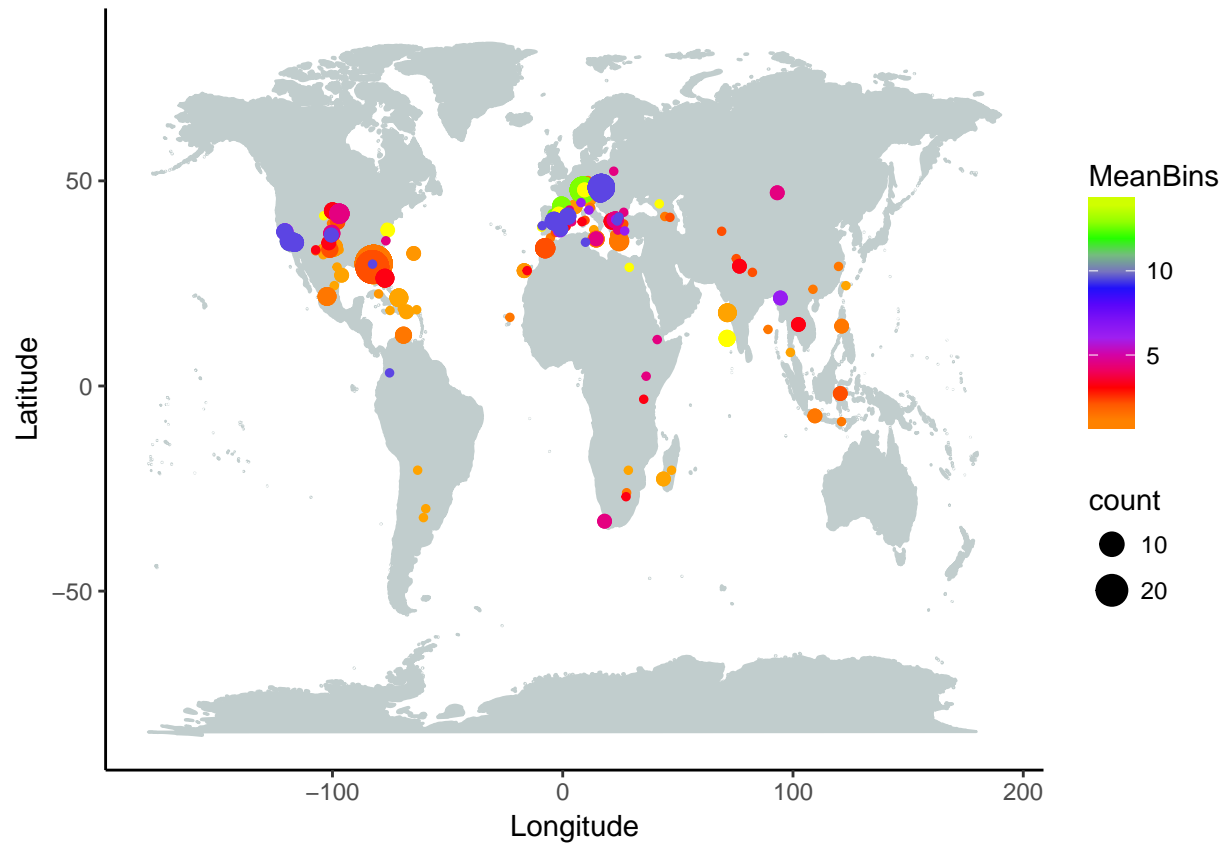


Figure 3: Map displaying all localities for which body size data for testudinids was available in the literature. Size of points denotes sample size, color denotes approximate age.

EpochBins	Taxon	n	meanCL
Upper Pleistocene	<i>Centrochelys robusta</i>	1	850.0000
Upper Pleistocene	<i>Chelonoidis denticulata</i>	1	616.0000
Upper Pleistocene	<i>Chelonoidis lutzae</i>	1	830.0000
Upper Pleistocene	<i>Chelonoidis marcanoi</i>	4	672.2500
Upper Pleistocene	<i>Chelonoidis monensis</i>	1	500.0000
Upper Pleistocene	<i>Chelonoidis sombrerensis</i>	1	990.0000
Upper Pleistocene	<i>Chelonoidis</i> sp.	3	666.6667
Upper Pleistocene	<i>Eurotestudo hermanni</i>	1	187.0000
Upper Pleistocene	gen. indet.	1	813.0000
Upper Pleistocene	<i>Geochelone</i> sp.	2	475.0000
Upper Pleistocene	<i>Gopherus agassizi</i>	1	252.0000

EpochBins	Taxon	n	meanCL
Upper Pleistocene	<i>Gopherus polyphemus</i>	20	292.9700
Upper Pleistocene	<i>Gopherus praecedens</i>	1	360.0000
Upper Pleistocene	<i>Hesperotestudo crassiscutata</i>	6	435.1667
Upper Pleistocene	<i>Hesperotestudo incisa</i>	1	232.7600
Upper Pleistocene	<i>Hesperotestudo</i> sp.	2	806.5000
Upper Pleistocene	<i>Hesperotestudo wilsoni</i>	1	226.0000
Upper Pleistocene	<i>Indotestudo elongata</i>	1	270.0000
Middle Pleistocene	<i>Centrochelys burchardi</i>	4	722.5000
Middle Pleistocene	<i>Chelonoidis cubensis</i>	1	1139.0000
Middle Pleistocene	<i>Eurotestudo</i> aff. <i>hermanni</i>	2	187.0000
Middle Pleistocene	<i>Eurotestudo hermanni</i>	2	204.0500
Middle Pleistocene	<i>Geochelone</i> sp.	1	170.0000
Middle Pleistocene	<i>Gopherus agassizi</i>	1	445.0000
Middle Pleistocene	<i>Gopherus laticaudatus</i>	1	375.0000
Middle Pleistocene	<i>Gopherus polyphemus</i>	31	300.4316
Middle Pleistocene	<i>Hesperotestudo bermudae</i>	2	385.0000
Middle Pleistocene	<i>Hesperotestudo equicomes</i>	1	340.0000
Middle Pleistocene	<i>Hesperotestudo</i> sp.	2	1650.0000
Middle Pleistocene	<i>Testudo kenitrensis</i>	1	132.0000
Middle Pleistocene	<i>Testudo lunellensis</i>	4	215.4250
Lower Pleistocene	<i>Centrochelys atlantica</i>	1	400.0000
Lower Pleistocene	<i>Centrochelys robusta</i>	3	883.3333
Lower Pleistocene	<i>Cheirogaster</i> cf. <i>gymnesica</i>	1	789.0000
Lower Pleistocene	<i>Cheirogaster</i> sp.	1	925.0000
Lower Pleistocene	<i>Chelonoidis</i> sp.	3	716.6667
Lower Pleistocene	<i>Eurotestudo globosa</i>	1	263.0000
Lower Pleistocene	<i>Eurotestudo hermanni</i>	2	205.0000
Lower Pleistocene	gen. indet.	1	900.0000
Lower Pleistocene	<i>Geochelone</i> sp.	1	340.0000
Lower Pleistocene	<i>Gopherus berlandieri</i>	2	225.6500
Lower Pleistocene	<i>Gopherus flavomarginatus</i>	1	450.0000

EpochBins	Taxon	n	meanCL
Lower Pleistocene	<i>Gopherus pertenuis</i>	1	1050.0000
Lower Pleistocene	<i>Gopherus polyphemus</i>	3	254.4667
Lower Pleistocene	<i>Gopherus</i> sp.	6	233.9667
Lower Pleistocene	<i>Hesperotestudo crassiscutata</i>	5	285.6000
Lower Pleistocene	<i>Hesperotestudo incisa</i>	7	234.6286
Lower Pleistocene	<i>Hesperotestudo mlynarskii</i>	2	184.2500
Lower Pleistocene	<i>Hesperotestudo</i> sp.	1	1500.0000
Lower Pleistocene	<i>Hesperotestudo turgida</i>	1	230.0000
Lower Pleistocene	<i>Megalochelys sondaari</i>	2	909.0000
Lower Pleistocene	<i>Megalochelys</i> sp.	3	1130.4667
Lower Pleistocene	<i>Psammobates antiquorum</i>	1	107.8000
Lower Pleistocene	<i>Testudo changshanesis</i>	1	330.0000
Lower Pleistocene	<i>Testudo graeca</i>	1	195.0000
Lower Pleistocene	<i>Testudo hermanni</i>	2	176.5500
Lower Pleistocene	<i>Testudo marginata</i>	3	270.0000
Lower Pleistocene	<i>Titanochelon gymnesica</i>	1	1300.0000
Gelasian	<i>Centrochelys marocana</i>	1	2050.0000
Gelasian	<i>Eurotestudo</i> cf. <i>hermanni</i>	1	150.0000
Gelasian	<i>Gopherus</i> sp.	15	185.7467
Gelasian	<i>Hesperotestudo campester</i>	1	1000.0000
Gelasian	<i>Hesperotestudo</i> sp.	1	1000.0000
Gelasian	<i>Manouria punjabiensis</i>	1	900.0000
Gelasian	<i>Megalochelys atlas</i>	3	1683.3333
Gelasian	<i>Testudo</i> aff. <i>kenitrensis</i>	1	142.0000
Gelasian	<i>Testudo oughlamensis</i>	1	120.0000
Gelasian	<i>Testudo ranovi</i>	1	200.0000
Gelasian	<i>Testudo</i> sp.	2	192.0000
Gelasian	<i>Testudo transcaucasia</i>	1	150.0000
Gelasian	<i>Titanochelon</i> aff. <i>schafferi</i>	1	1860.0000
Gelasian	<i>Titanochelon</i> sp.	1	1420.0000
Piacencian	“ <i>Aldabrachelys</i> ” <i>laetoliensis</i>	1	1000.0000

EpochBins	Taxon	n	meanCL
Piacencian	Aldabrachelys ? sp.	2	1500.0000
Piacencian	Centrochelys vulcanica	1	610.0000
Piacencian	Chelonoidis alburyorum	4	442.7500
Piacencian	Gopherus canyonensis	1	885.5000
Piacencian	Hesperotestudo johnstoni	1	235.0000
Piacencian	Hesperotestudo oelrichi	1	283.8000
Piacencian	Hesperotestudo riggsi	2	180.5000
Piacencian	Hesperotestudo sp.	1	176.0000
Piacencian	Homopus fenestratus	1	90.0000
Piacencian	Megalochelys atlas	2	1600.0000
Piacencian	Testudo brevitesta	2	232.5000
Piacencian	Testudo pecorinii	1	225.0000
Piacencian	Titanochelon sp.	1	520.0000
Zanclean	Caudochelys rexroadensis	2	805.5000
Zanclean	Centrochelys robusta	3	913.3333
Zanclean	Cheirogaster gymnesica	1	739.0000
Zanclean	Ergilemys oskarkuhni	2	209.0000
Zanclean	Geochelone crassa	1	865.0000
Zanclean	Geochelone s. l.	1	1750.0000
Zanclean	Geochelone sp.	2	528.0000
Zanclean	Geochelone stromeri	2	387.5000
Zanclean	Hesperotestudo riggsi	1	195.8000
Zanclean	Testudo cf. graeca	1	185.0000
Zanclean	Testudo sp.	4	1675.0000
Zanclean	Titanochelon bacharidisi	4	1040.0000
Zanclean	Titanochelon perpiniana	1	1140.0000
Zanclean	Titanochelon schafferi	1	2500.0000
Messinian	Hesperotestudo orthopygia	2	941.0000
Messinian	Megalochelys atlas	2	1950.0000
Messinian	Testudo amiatae	1	140.0000
Messinian	Testudo graeca	2	183.5000

EpochBins	Taxon	n	meanCL
Messinian	Testudo sp.	1	200.0000
Messinian	Titanochelon bolivari	1	1150.0000
Messinian	Titanochelon schafferi	1	1850.0000
Tortonian	“Hadrianus sp.”	1	1000.0000
Tortonian	Cheirogaster richardi	1	1155.0000
Tortonian	Cheirogaster sp.	2	1355.0000
Tortonian	gen. indet.	3	660.0000
Tortonian	Geochelone hesterna	1	278.0000
Tortonian	Geochelone sp.	2	973.0000
Tortonian	Gopherus ? sp.	1	500.0000
Tortonian	Gopherus mohavetus	5	324.8000
Tortonian	Hesperotestudo alleni	1	240.9000
Tortonian	Hesperotestudo riggsi	2	159.5000
Tortonian	Hesperotestudo sp.	1	1200.0000
Tortonian	Paleotestudo sp.	3	233.6667
Tortonian	Testudo burgenlandica	2	193.5000
Tortonian	Testudo catalaunica	4	157.0000
Tortonian	Testudo cf. promarginata	5	250.0000
Tortonian	Testudo graeca	1	210.0000
Tortonian	Testudo s. s.	1	189.0000
Tortonian	Testudo sp.	7	243.1571
Tortonian	Titanochelon bolivari	1	1300.0000
Tortonian	Titanochelon cf. bolivari	1	1500.0000
Serravallian	Cheirogaster sp.	2	1250.0000
Serravallian	gen. indet.	1	270.0000
Serravallian	Gopherus ? sp.	1	500.0000
Serravallian	Paleotestudo antiqua	18	203.0556
Serravallian	Paleotestudo cf. sp.	1	270.0000
Serravallian	Testudo catalaunica	1	232.0000
Serravallian	Testudo steinheimensis	2	169.3500
Serravallian	Titanochelon bolivari	1	1353.0000

EpochBins	Taxon	n	meanCL
Langhian	Caudochelys ducatei	1	339.9000
Langhian	Chelonoidis sp.	3	553.3333
Langhian	Ergilemys sp.	1	1000.0000
Langhian	gen. indet.	1	1000.0000
Langhian	Paleotestudo antiqua	1	275.0000
Langhian	Paleotestudo cf. sp.	1	270.0000
Langhian	Testudo kalksburgensis	1	275.0000
Langhian	Testudo sp.	1	400.0000
Langhian	Titanochelon bolivari	2	1175.0000
Langhian	Titanochelon cf. bolivari	2	1450.0000
Burdigalian/Aquitania	Caudochelys williamsi	1	334.0000
Burdigalian/Aquitania	gen. indet.	1	270.0000
Burdigalian/Aquitania	Geochelone sp.	2	900.0000
Burdigalian/Aquitania	Geochelone tedwhitei	2	405.0000
Burdigalian/Aquitania	Impregnochelys pachytectis	1	620.0000
Burdigalian/Aquitania	Mesocherus orangeus	5	180.0000
Burdigalian/Aquitania	Namibchersus aff. namaquensis	3	696.6667
Burdigalian/Aquitania	Namibchersus namaquensis	6	428.8333
Burdigalian/Aquitania	Paleotestudo cf. antiqua	1	113.0000
Burdigalian/Aquitania	Paleotestudo sp.	1	179.3000
Burdigalian/Aquitania	Testudo kalksburgensis	2	227.5000
Burdigalian/Aquitania	Testudo promarginata	3	281.5667
Burdigalian/Aquitania	Testudo rectogularis	1	213.0000
Burdigalian/Aquitania	Titanochelon cf. perpiniana	1	1001.0000

Taxon	n	meanCL
“Aldabrachelys” laetoliensis	1	1000.0000
“Hadrianus sp.”	1	1000.0000
Aldabrachelys ? sp.	2	1500.0000
Caudochelys ducatei	1	339.9000

Taxon	n	meanCL
<i>Caudochelys rexroadensis</i>	2	805.5000
<i>Caudochelys williamsi</i>	1	334.0000
<i>Centrochelys atlantica</i>	1	400.0000
<i>Centrochelys burchardi</i>	4	722.5000
<i>Centrochelys marocana</i>	1	2050.0000
<i>Centrochelys robusta</i>	7	891.4286
<i>Centrochelys vulcanica</i>	1	610.0000
<i>Cheirogaster cf. gymnesica</i>	1	789.0000
<i>Cheirogaster gymnesica</i>	1	739.0000
<i>Cheirogaster richardi</i>	1	1155.0000
<i>Cheirogaster sp.</i>	5	1227.0000
<i>Chelonoidis alburyorum</i>	4	442.7500
<i>Chelonoidis cubensis</i>	1	1139.0000
<i>Chelonoidis denticulata</i>	1	616.0000
<i>Chelonoidis lutzae</i>	1	830.0000
<i>Chelonoidis marcanoi</i>	4	672.2500
<i>Chelonoidis monensis</i>	1	500.0000
<i>Chelonoidis sombrerensis</i>	1	990.0000
<i>Chelonoidis sp.</i>	9	645.5556
<i>Ergilemys oskarkuhni</i>	2	209.0000
<i>Ergilemys sp.</i>	1	1000.0000
<i>Eurotestudo aff. hermanni</i>	2	187.0000
<i>Eurotestudo cf. hermanni</i>	1	150.0000
<i>Eurotestudo globosa</i>	1	263.0000
<i>Eurotestudo hermanni</i>	5	201.0200
gen. indet.	8	654.1250
<i>Geochelone crassa</i>	1	865.0000
<i>Geochelone hesternae</i>	1	278.0000
<i>Geochelone s. l.</i>	1	1750.0000
<i>Geochelone sp.</i>	10	626.2000
<i>Geochelone stromeri</i>	2	387.5000

Taxon	n	meanCL
<i>Geochelone tedwhitei</i>	2	405.0000
<i>Gopherus ? sp.</i>	2	500.0000
<i>Gopherus agassizi</i>	2	348.5000
<i>Gopherus berlandieri</i>	2	225.6500
<i>Gopherus canyonensis</i>	1	885.5000
<i>Gopherus flavomarginatus</i>	1	450.0000
<i>Gopherus laticaudatus</i>	1	375.0000
<i>Gopherus mohavetus</i>	5	324.8000
<i>Gopherus pertenuis</i>	1	1050.0000
<i>Gopherus polyphemus</i>	54	295.1144
<i>Gopherus praecedens</i>	1	360.0000
<i>Gopherus sp.</i>	21	199.5238
<i>Hesperotestudo alleni</i>	1	240.9000
<i>Hesperotestudo bermudae</i>	2	385.0000
<i>Hesperotestudo campester</i>	1	1000.0000
<i>Hesperotestudo crassiscutata</i>	11	367.1818
<i>Hesperotestudo equicomes</i>	1	340.0000
<i>Hesperotestudo incisa</i>	8	234.3950
<i>Hesperotestudo johnstoni</i>	1	235.0000
<i>Hesperotestudo mlynarskii</i>	2	184.2500
<i>Hesperotestudo oelrichi</i>	1	283.8000
<i>Hesperotestudo orthopygia</i>	2	941.0000
<i>Hesperotestudo riggsi</i>	5	175.1600
<i>Hesperotestudo sp.</i>	8	1098.6250
<i>Hesperotestudo turgida</i>	1	230.0000
<i>Hesperotestudo wilsoni</i>	1	226.0000
<i>Homopus fenestratus</i>	1	90.0000
<i>Impregnochelys pachytectis</i>	1	620.0000
<i>Indotestudo elongata</i>	1	270.0000
<i>Manouria punjabiensis</i>	1	900.0000
<i>Megalochelys atlas</i>	7	1735.7143

Taxon	n	meanCL
Megalochelys sondaari	2	909.0000
Megalochelys sp.	3	1130.4667
Mesocherus orangeus	5	180.0000
Namibchersus aff. namaquensis	3	696.6667
Namibchersus namaquensis	6	428.8333
Paleotestudo antiqua	19	206.8421
Paleotestudo cf. antiqua	1	113.0000
Paleotestudo cf. sp.	2	270.0000
Paleotestudo sp.	4	220.0750
Psammobates antiquorum	1	107.8000
Testudo aff. kenitrensis	1	142.0000
Testudo amiatae	1	140.0000
Testudo brevitesta	2	232.5000
Testudo burgenlandica	2	193.5000
Testudo catalaunica	5	172.0000
Testudo cf. graeca	1	185.0000
Testudo cf. promarginata	5	250.0000
Testudo changshanesis	1	330.0000
Testudo graeca	4	193.0000
Testudo hermanni	2	176.5500
Testudo kalksburgensis	3	243.3333
Testudo kenitrensis	1	132.0000
Testudo lunellensis	4	215.4250
Testudo marginata	3	270.0000
Testudo oughlamensis	1	120.0000
Testudo pecorinii	1	225.0000
Testudo promarginata	3	281.5667
Testudo ranovi	1	200.0000
Testudo rectogularis	1	213.0000
Testudo s. s.	1	189.0000
Testudo sp.	15	625.7400

Taxon	n	meanCL
Testudo steinheimensis	2	169.3500
Testudo transcaucasia	1	150.0000
Titanochelon aff. schafferi	1	1860.0000
Titanochelon bacharidisi	4	1040.0000
Titanochelon bolivari	5	1230.6000
Titanochelon cf. bolivari	3	1466.6667
Titanochelon cf. perpiniana	1	1001.0000
Titanochelon gymnesica	1	1300.0000
Titanochelon perpiniana	1	1140.0000
Titanochelon schafferi	2	2175.0000
Titanochelon sp.	2	970.0000

EpochBins	Genus	n	meanCL
Modern	Aldabrachelys	12	974.5833
Modern	Astrochelys	14	366.2143
Modern	Centrochelys	3	493.3333
Modern	Chelonoidis	45	531.5178
Modern	Chersina	15	176.2667
Modern	Cylindraspis	5	724.0000
Modern	Geochelone	8	252.1250
Modern	Gopherus	23	302.4839
Modern	Hesperotestudo	1	250.0000
Modern	Homopus	7	139.2857
Modern	Indotestudo	16	242.9875
Modern	Kinixys	15	213.0667
Modern	Malacochersus	2	166.5000
Modern	Manouria	9	380.7778
Modern	Psammobates	17	113.4118
Modern	Pyxis	16	124.1875
Modern	Stigmochelys	6	405.3333

EpochBins	Genus	n	meanCL
Modern	Testudo	39	197.5436
Upper Pleistocene	Centrochelys	1	850.0000
Upper Pleistocene	Chelonoidis	11	693.1818
Upper Pleistocene	Eurotestudo	1	187.0000
Upper Pleistocene	gen.	1	813.0000
Upper Pleistocene	Geochelone	2	475.0000
Upper Pleistocene	Gopherus	22	294.1545
Upper Pleistocene	Hesperotestudo	10	468.2760
Upper Pleistocene	Indotestudo	1	270.0000
Middle Pleistocene	Centrochelys	4	722.5000
Middle Pleistocene	Chelonoidis	1	1139.0000
Middle Pleistocene	Eurotestudo	4	195.5250
Middle Pleistocene	Geochelone	1	170.0000
Middle Pleistocene	Gopherus	33	307.0721
Middle Pleistocene	Hesperotestudo	5	882.0000
Middle Pleistocene	Testudo	5	198.7400
Lower Pleistocene	Centrochelys	4	762.5000
Lower Pleistocene	Cheirogaster	2	857.0000
Lower Pleistocene	Chelonoidis	3	716.6667
Lower Pleistocene	Eurotestudo	4	201.5250
Lower Pleistocene	gen.	1	900.0000
Lower Pleistocene	Geochelone	1	340.0000
Lower Pleistocene	Gopherus	13	316.8077
Lower Pleistocene	Hesperotestudo	16	323.0562
Lower Pleistocene	Megalochelys	5	1041.8800
Lower Pleistocene	Psammobates	1	107.8000
Lower Pleistocene	Testudo	6	259.1667
Lower Pleistocene	Titanochelon	1	1300.0000
Gelasian	Centrochelys	1	2050.0000
Gelasian	Eurotestudo	1	150.0000
Gelasian	Gopherus	15	185.7467

EpochBins	Genus	n	meanCL
Gelasian	Hesperotestudo	2	1000.0000
Gelasian	Manouria	1	900.0000
Gelasian	Megalochelys	3	1683.3333
Gelasian	Testudo	6	166.0000
Gelasian	Titanochelon	2	1640.0000
Piacencian	Aldabrachelys	3	1333.3333
Piacencian	Centrochelys	1	610.0000
Piacencian	Chelonoidis	4	442.7500
Piacencian	Gopherus	1	885.5000
Piacencian	Hesperotestudo	5	211.1600
Piacencian	Homopus	1	90.0000
Piacencian	Megalochelys	2	1600.0000
Piacencian	Testudo	3	230.0000
Piacencian	Titanochelon	1	520.0000
Zanclean	Caudochelys	2	805.5000
Zanclean	Centrochelys	3	913.3333
Zanclean	Cheirogaster	1	739.0000
Zanclean	Ergilemys	2	209.0000
Zanclean	Geochelone	6	741.0000
Zanclean	Hesperotestudo	1	195.8000
Zanclean	Testudo	5	1377.0000
Zanclean	Titanochelon	6	1300.0000
Messinian	Hesperotestudo	2	941.0000
Messinian	Megalochelys	2	1950.0000
Messinian	Testudo	4	176.7500
Messinian	Titanochelon	2	1500.0000
Tortonian	“Hadrianus”	1	1000.0000
Tortonian	Cheirogaster	3	1288.3333
Tortonian	gen.	3	660.0000
Tortonian	Geochelone	3	741.3333
Tortonian	Gopherus	6	354.0000

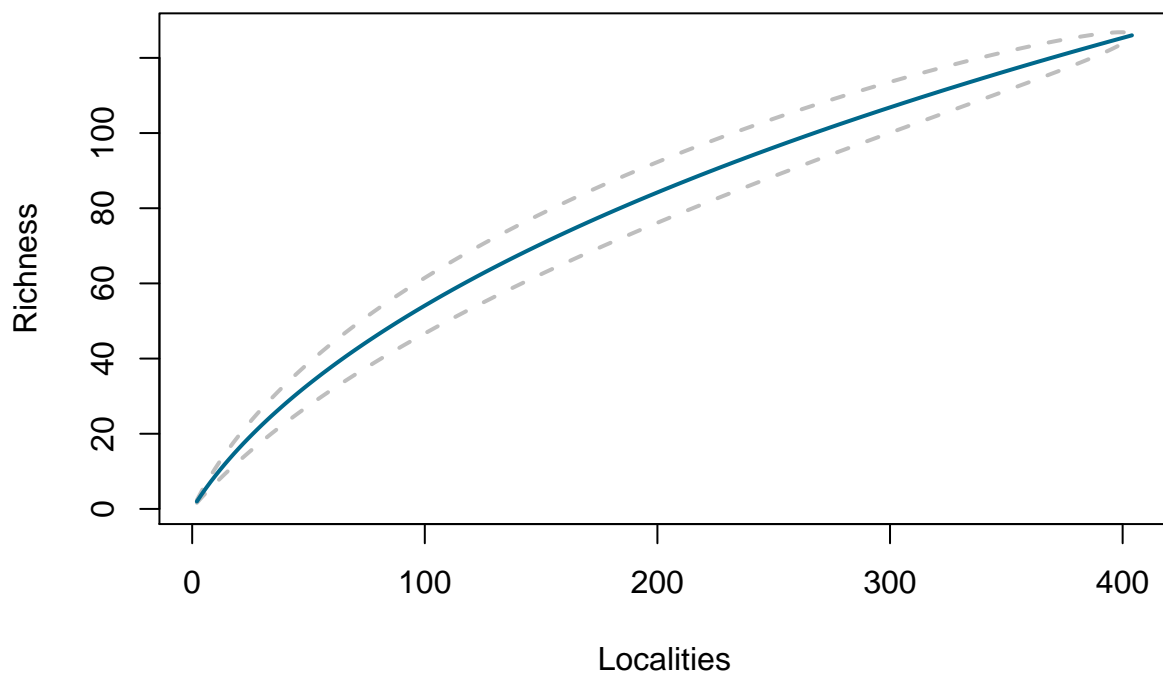
EpochBins	Genus	n	meanCL
Tortonian	Hesperotestudo	4	439.9750
Tortonian	Paleotestudo	3	233.6667
Tortonian	Testudo	20	218.3050
Tortonian	Titanochelon	2	1400.0000
Serravallian	Cheirogaster	2	1250.0000
Serravallian	gen.	1	270.0000
Serravallian	Gopherus	1	500.0000
Serravallian	Paleotestudo	19	206.5789
Serravallian	Testudo	3	190.2333
Serravallian	Titanochelon	1	1353.0000
Langhian	Caudochelys	1	339.9000
Langhian	Chelonoidis	3	553.3333
Langhian	Ergilemys	1	1000.0000
Langhian	gen.	1	1000.0000
Langhian	Paleotestudo	2	272.5000
Langhian	Testudo	2	337.5000
Langhian	Titanochelon	4	1312.5000
Burdigalian/Aquitania	Caudochelys	1	334.0000
Burdigalian/Aquitania	gen.	1	270.0000
Burdigalian/Aquitania	Geochelone	4	652.5000
Burdigalian/Aquitania	Impregnochelys	1	620.0000
Burdigalian/Aquitania	Mesocherus	5	180.0000
Burdigalian/Aquitania	Namibchersus	9	518.1111
Burdigalian/Aquitania	Paleotestudo	2	146.1500
Burdigalian/Aquitania	Testudo	6	252.1167
Burdigalian/Aquitania	Titanochelon	1	1001.0000

Genus	n	meanCL
“Hadrianus”	1	1000.0000
Aldabrachelys	15	1046.3333

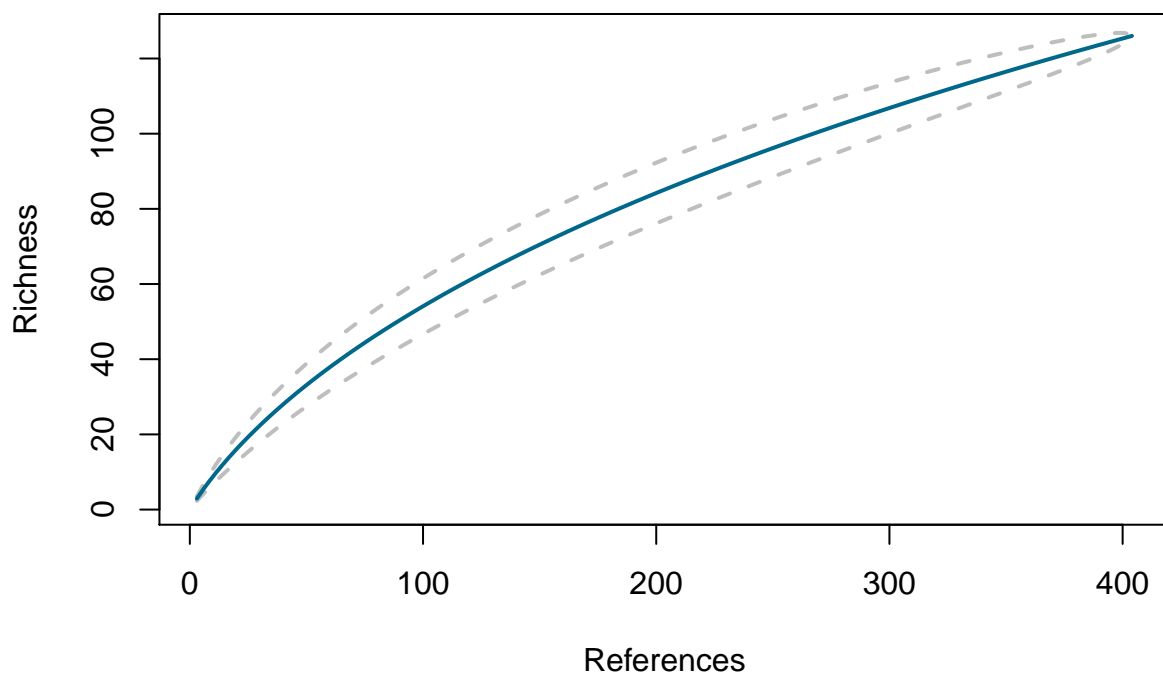
Genus	n	meanCL
Astrochelys	14	366.2143
Cauodochelys	4	571.2250
Centrochelys	17	804.1176
Cheirogaster	8	1102.2500
Chelonoidis	67	571.0940
Chersina	15	176.2667
Cylindraspis	5	724.0000
Ergilemys	3	472.6667
Eurotestudo	10	192.5200
gen.	8	654.1250
Geochelone	25	510.2800
Gopherus	114	298.0361
Hesperotestudo	46	465.3296
Homopus	8	133.1250
Impregnochelys	1	620.0000
Indotestudo	17	244.5765
Kinixys	15	213.0667
Malacochersus	2	166.5000
Manouria	10	432.7000
Megalochelys	12	1446.6167
Mesocherus	5	180.0000
Namibchersus	9	518.1111
Paleotestudo	26	210.1269
Psammobates	18	113.1000
Pyxis	16	124.1875
Stigmochelys	6	405.3333
Testudo	99	269.2465
Titanochelon	20	1315.2000

Sampling Accumulation Curves

Fossil species, CL, per Locality



Fossil species, CL, per Reference



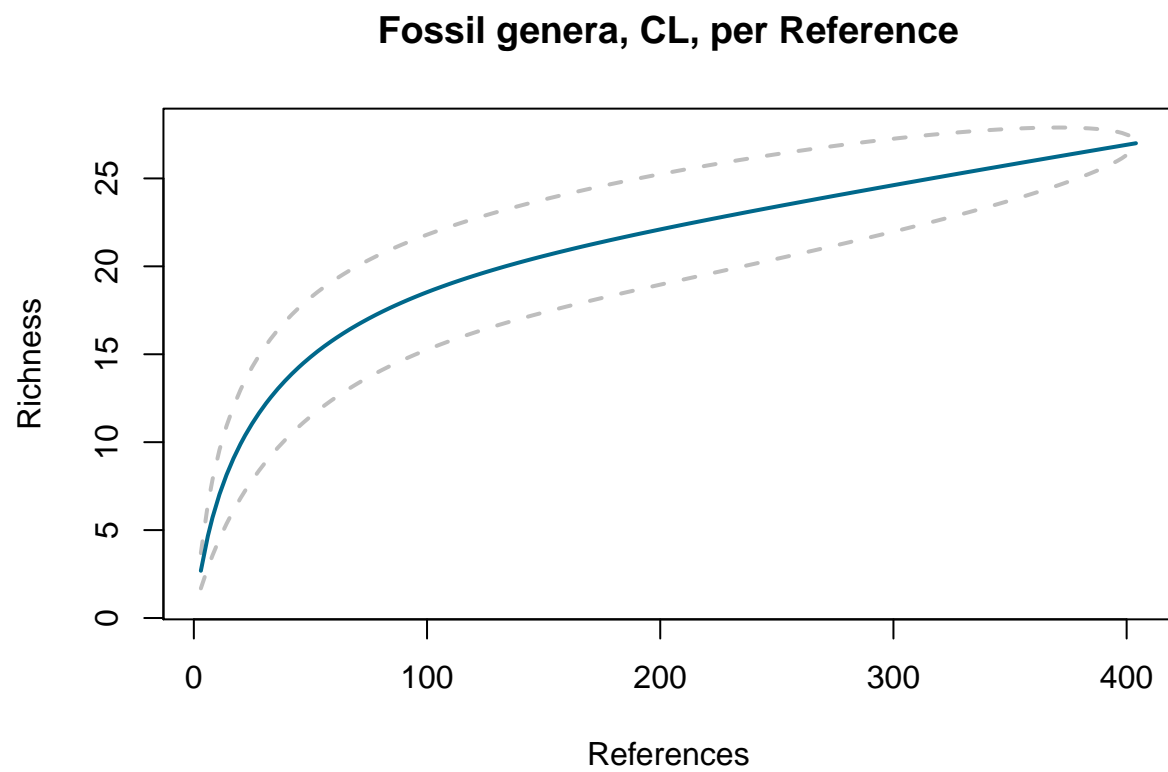


Figure 4: Sampling Accumulation Curve of fossil genera per reference

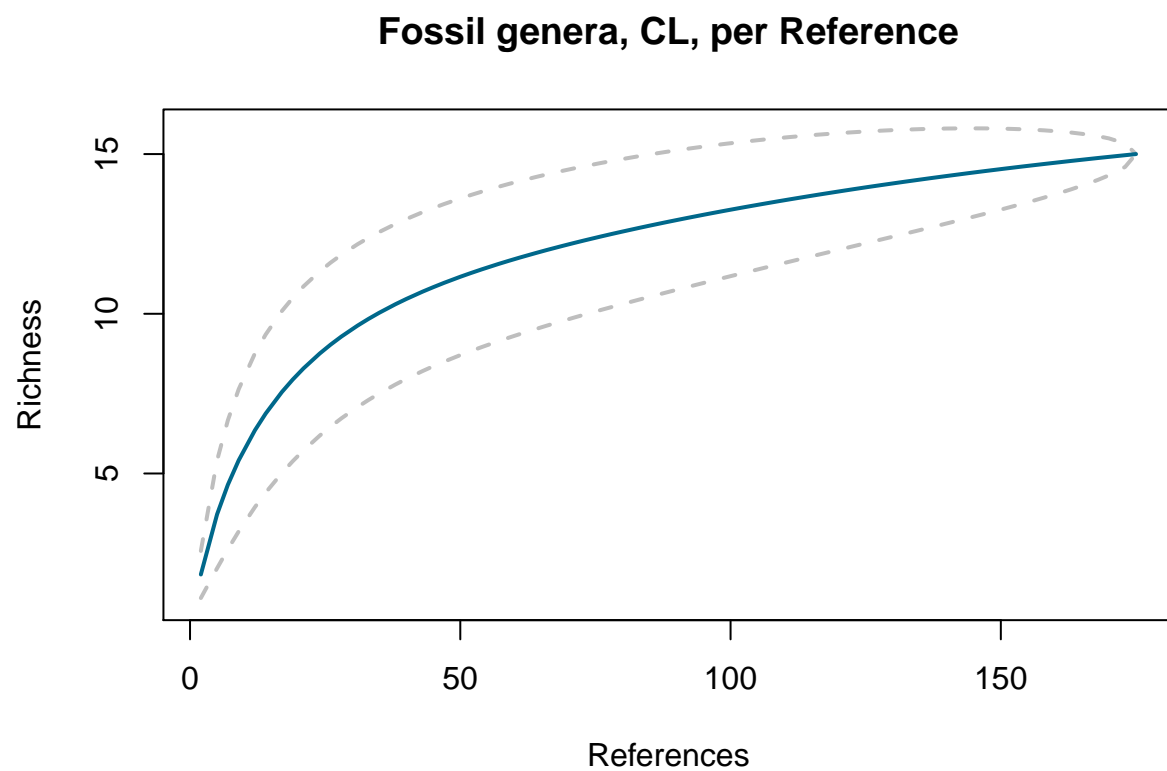


Figure 5: Sampling Accumulation Curve of fossil genera per reference, Eurasia

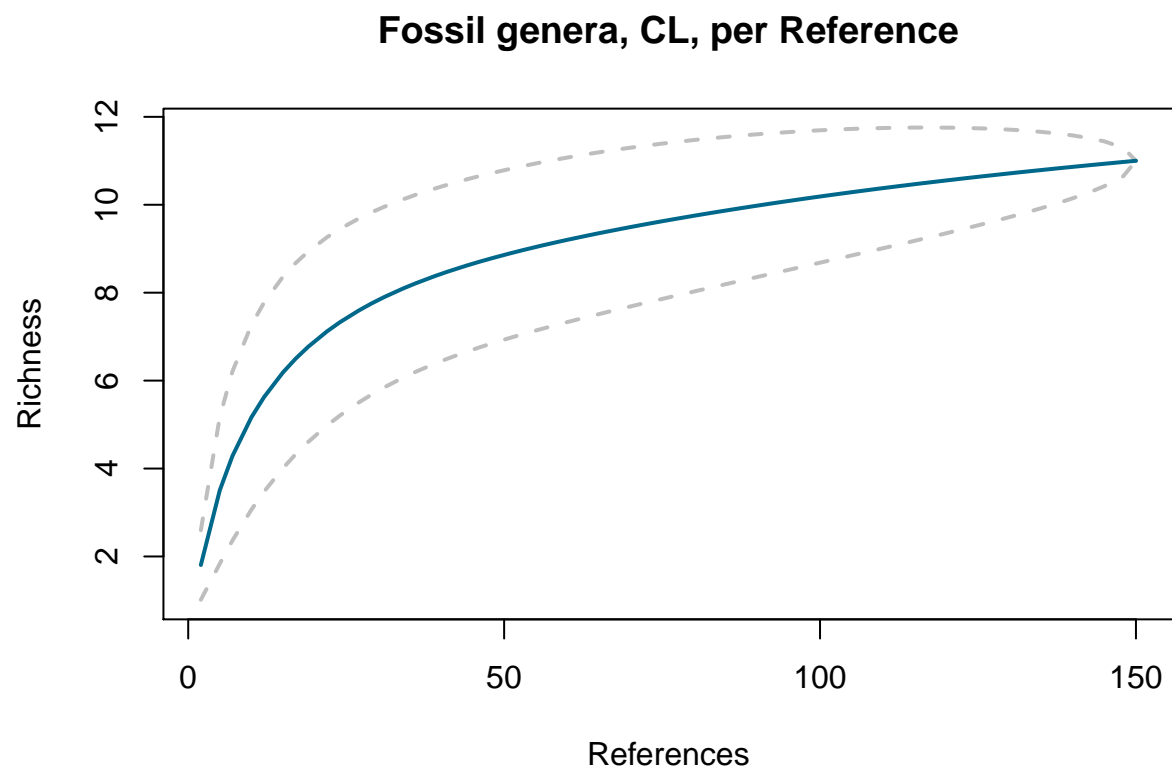


Figure 6: Sampling Accumulation Curve of fossil genera per reference, Europe

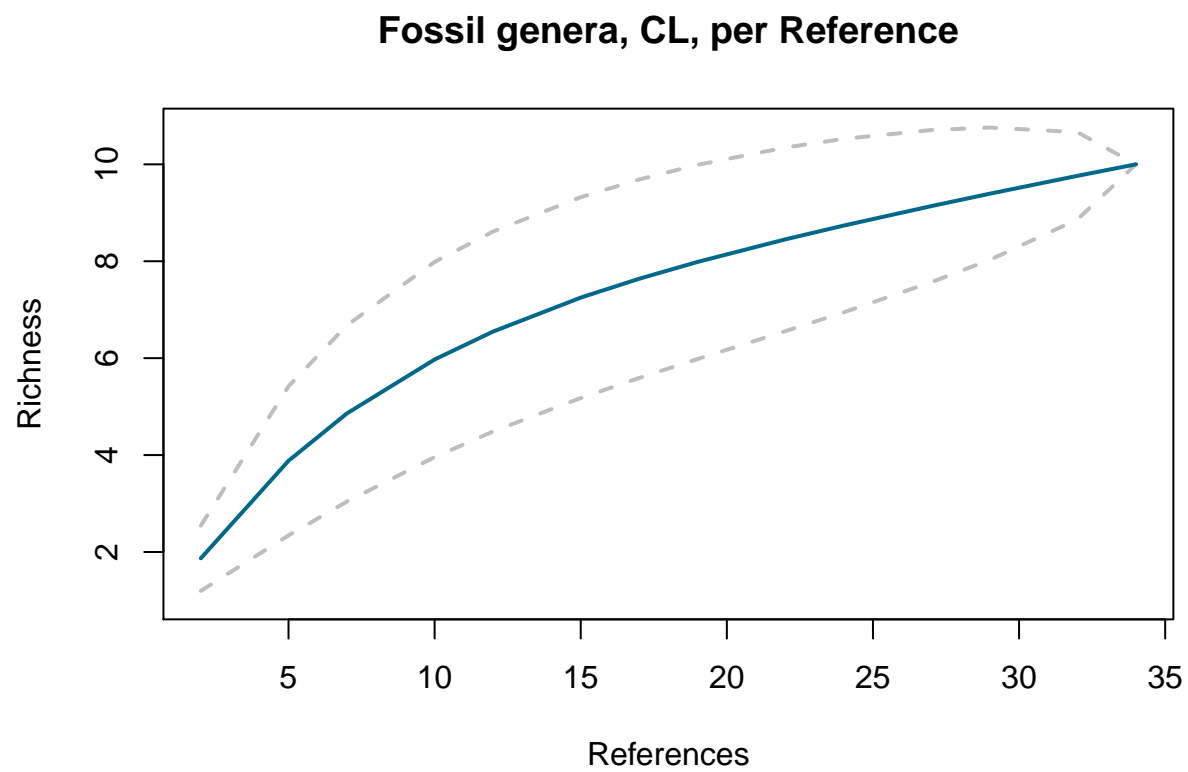


Figure 7: Sampling Accumulation Curve of fossil genera per reference, Africa

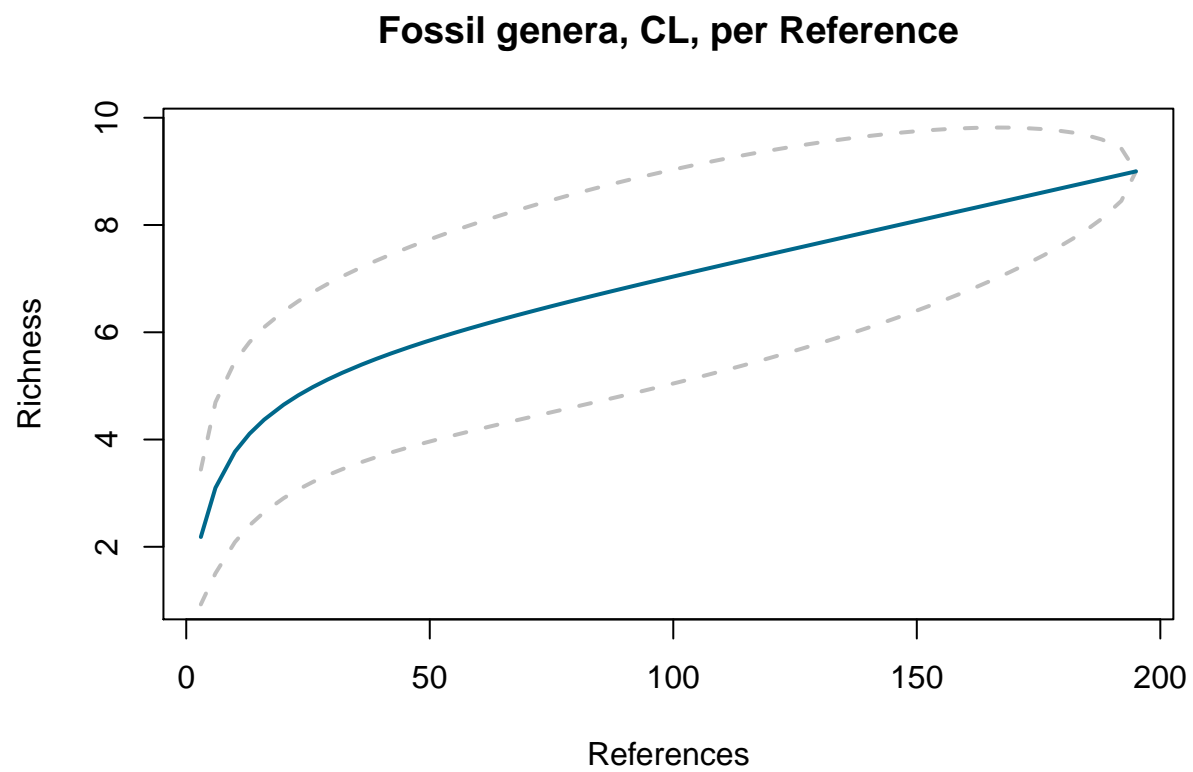


Figure 8: Sampling Accumulation Curve of fossil genera per reference, America

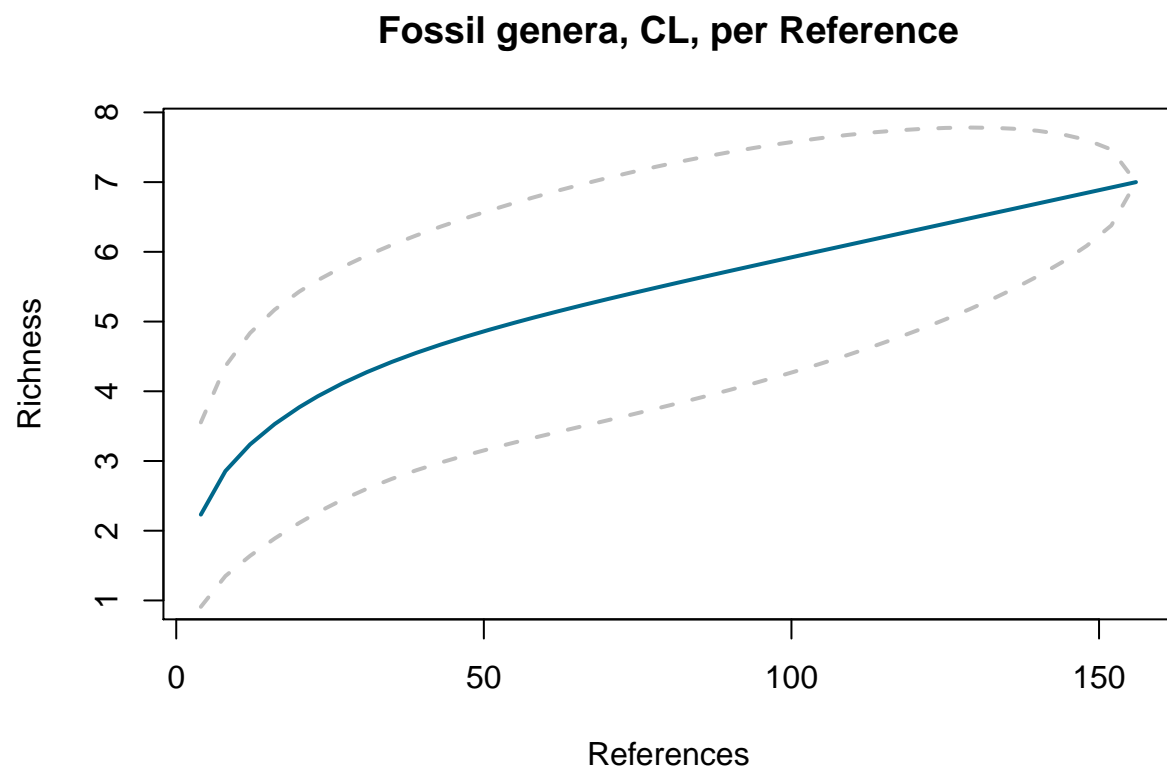


Figure 9: Sampling Accumulation Curve of fossil genera per reference, N-America

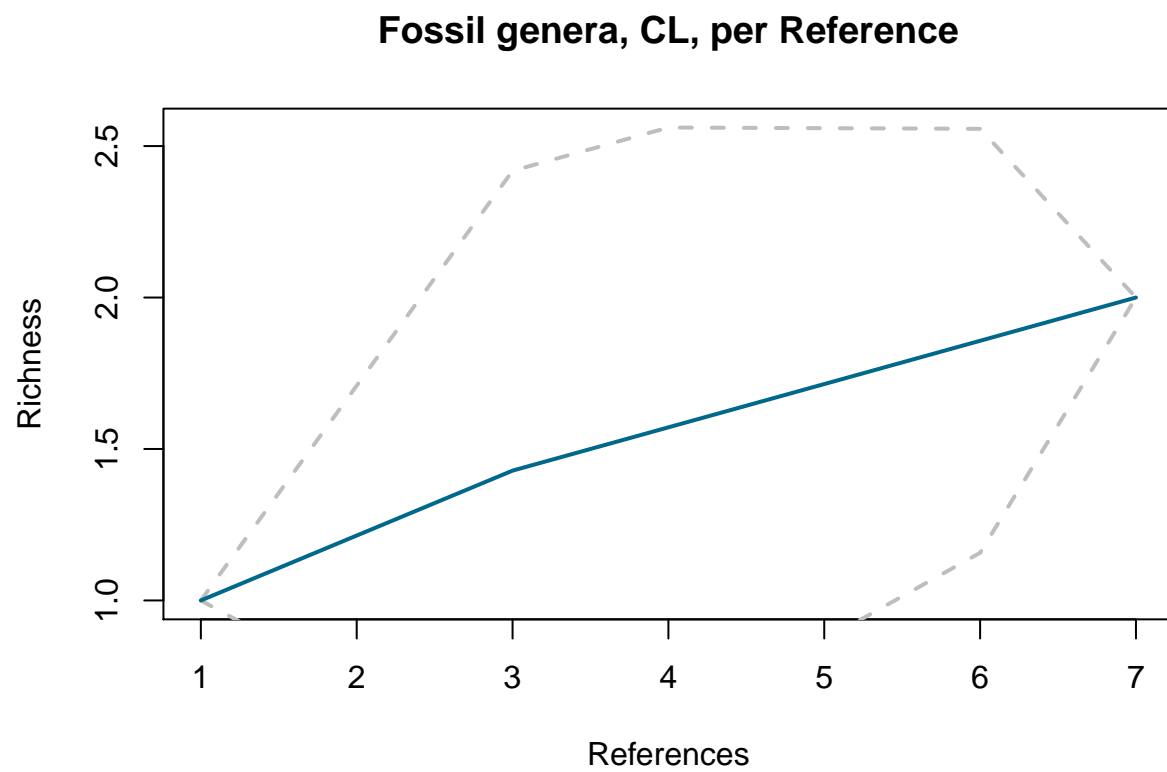


Figure 10: Sampling Accumulation Curve of fossil genera per reference, S-America

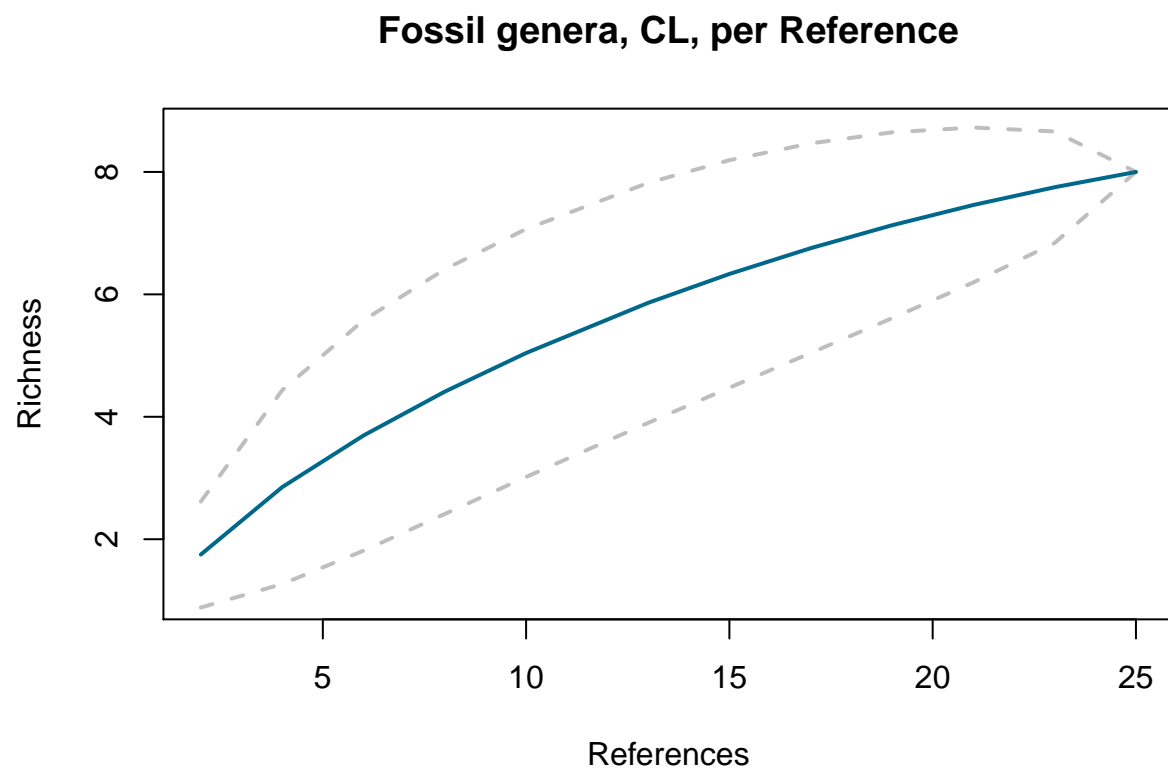


Figure 11: Sampling Accumulation Curve of fossil genera per reference, Asia

Histograms

all

```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```

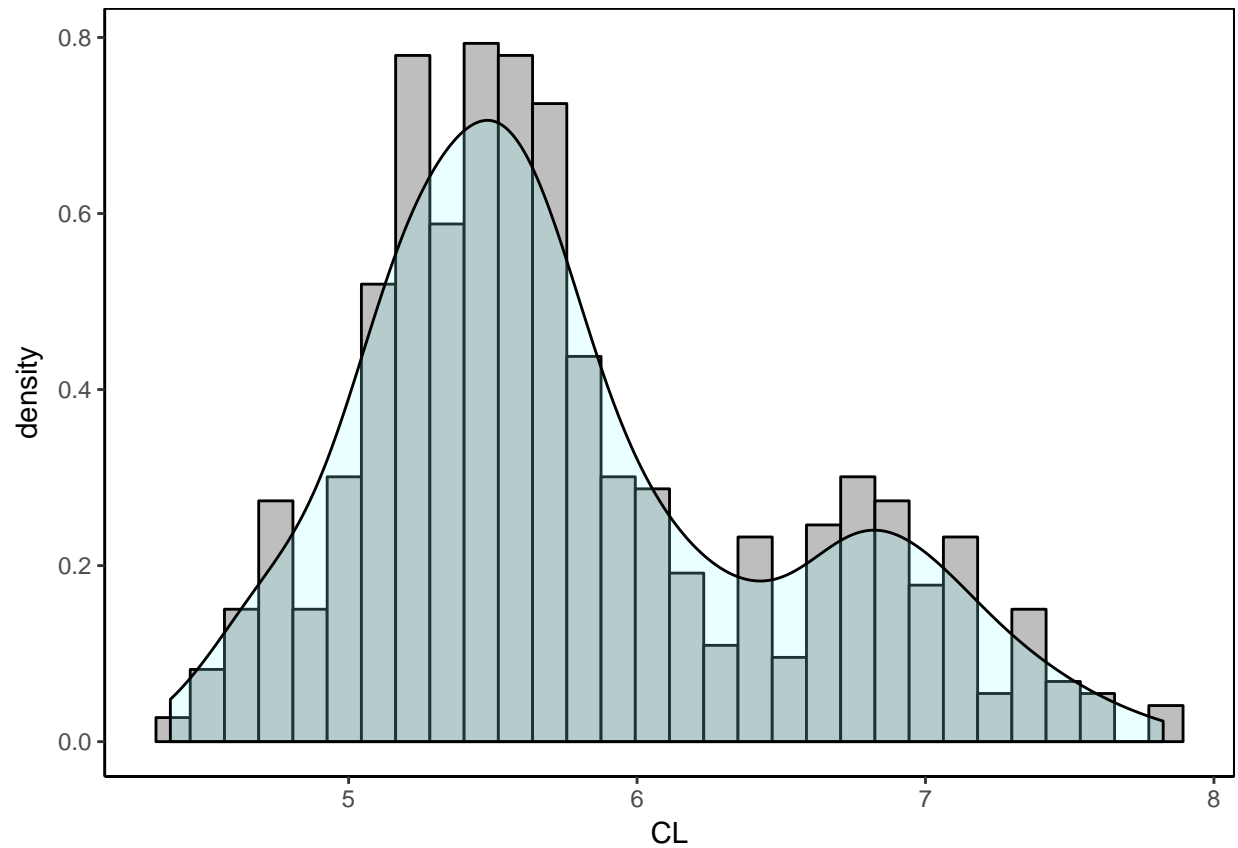
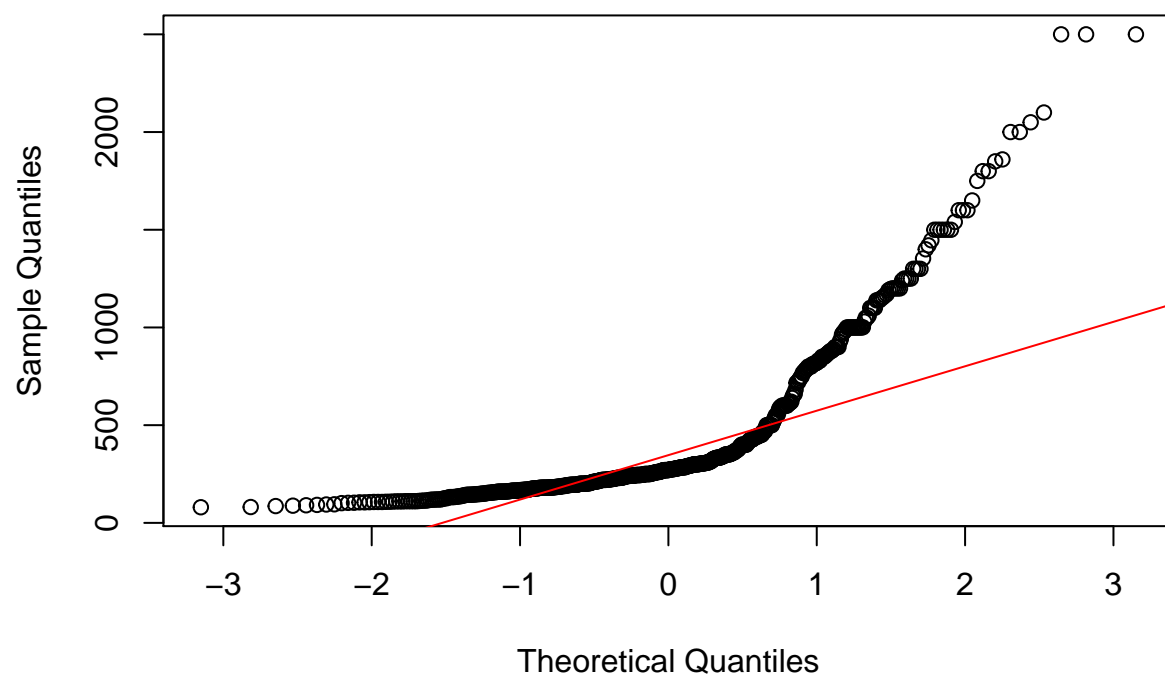


Figure 12: Distribution of body size data, logtransformed, all data.

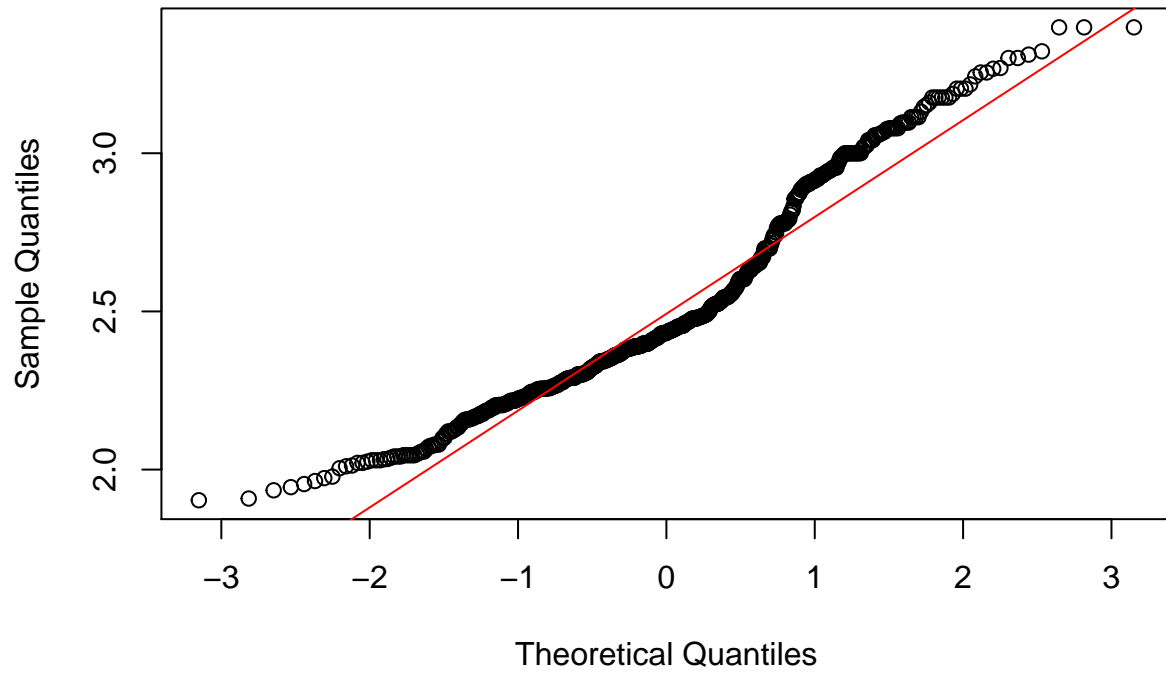
```
qqnorm(PleiPlioCL$CL); qqline(PleiPlioCL$CL, col=2)
```

Normal Q-Q Plot



```
qqnorm(log10(PleiPlioCL$CL)); qqline(log10(PleiPlioCL$CL), col=2)
```

Normal Q-Q Plot



per time bin

```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```

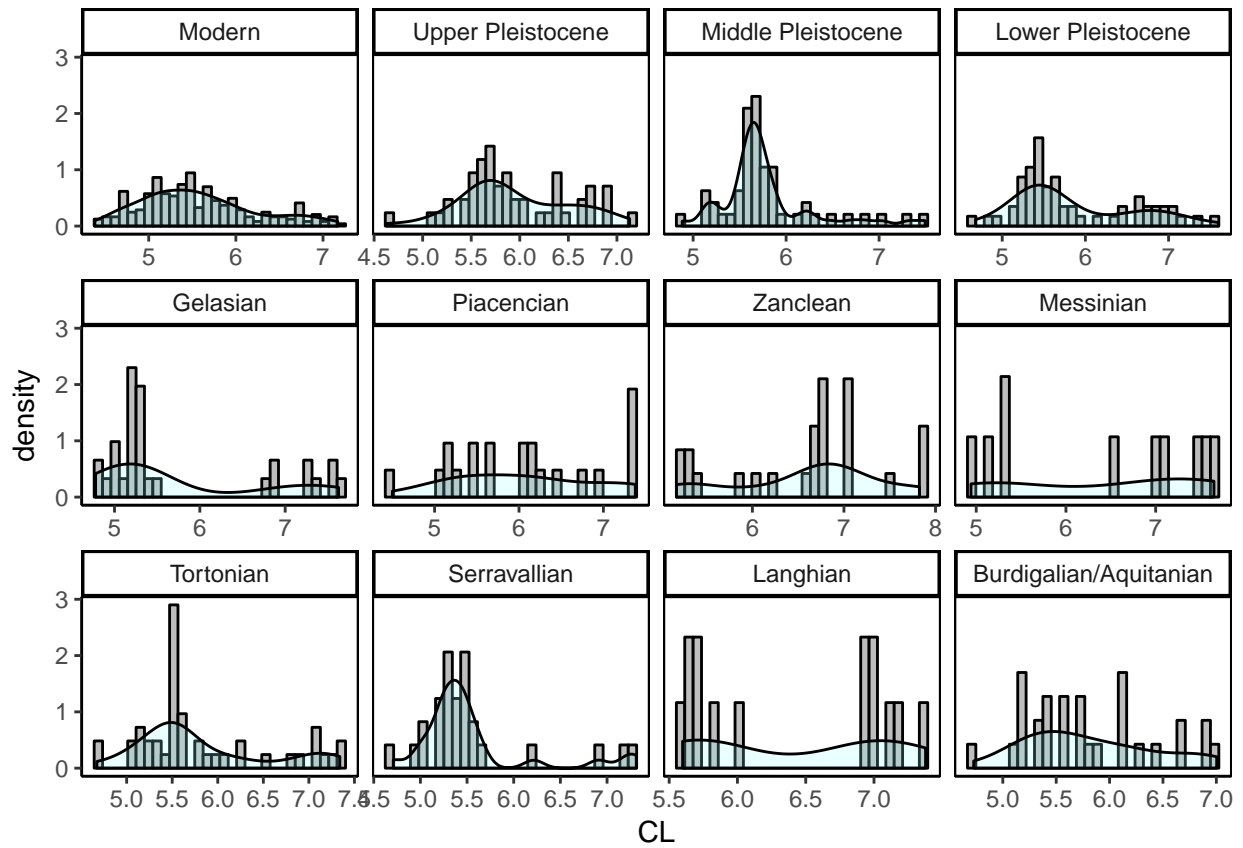


Figure 13: Distribution of body size data per time bin, logtransformed.

modern vs. fossil

```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```

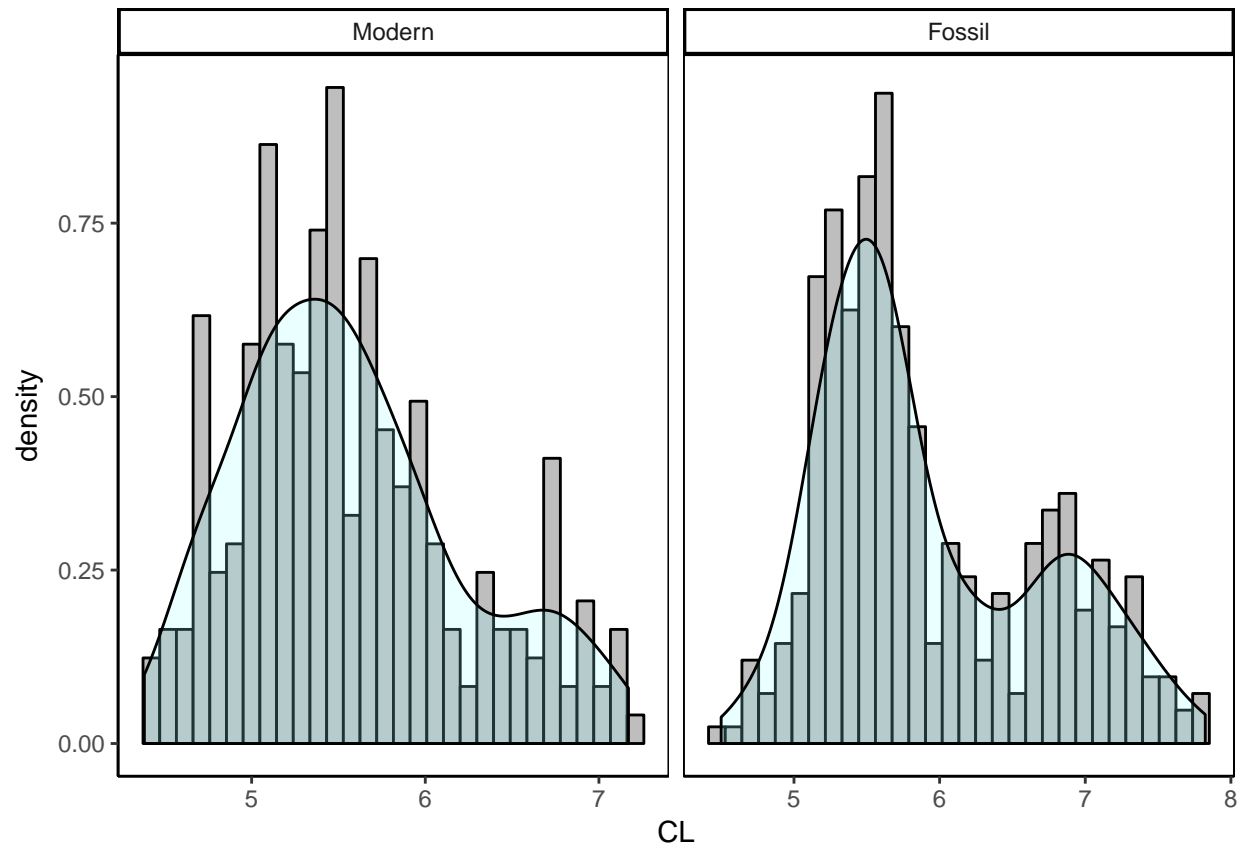


Figure 14: Distribution of body size data modern vs. fossil, logtransformed.

modern vs. fossil, continental vs. insular

`stat_bin()` using `bins = 30`. Pick better value with `binwidth`.

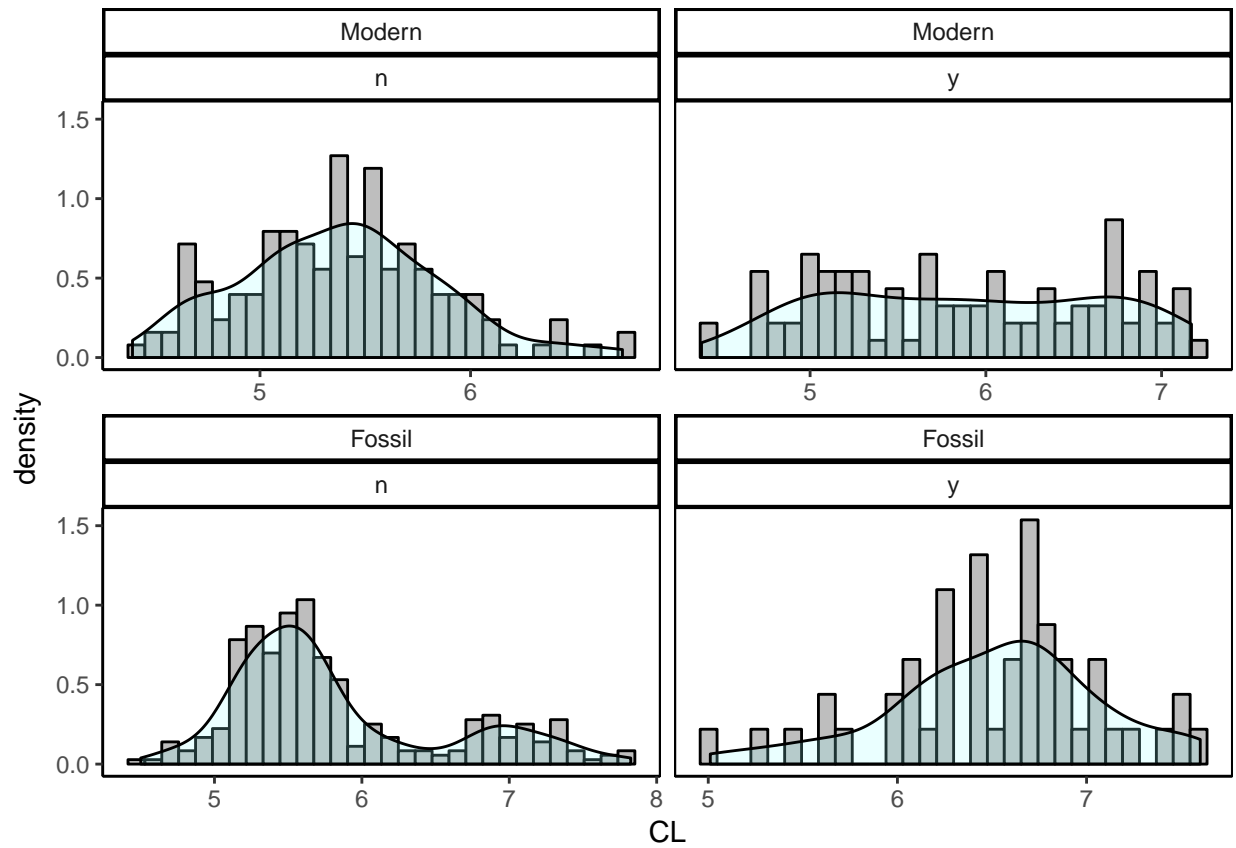


Figure 15: Distribution of body size data modern vs. fossil, continental vs. insular logtransformed.

continental vs. insular

```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```

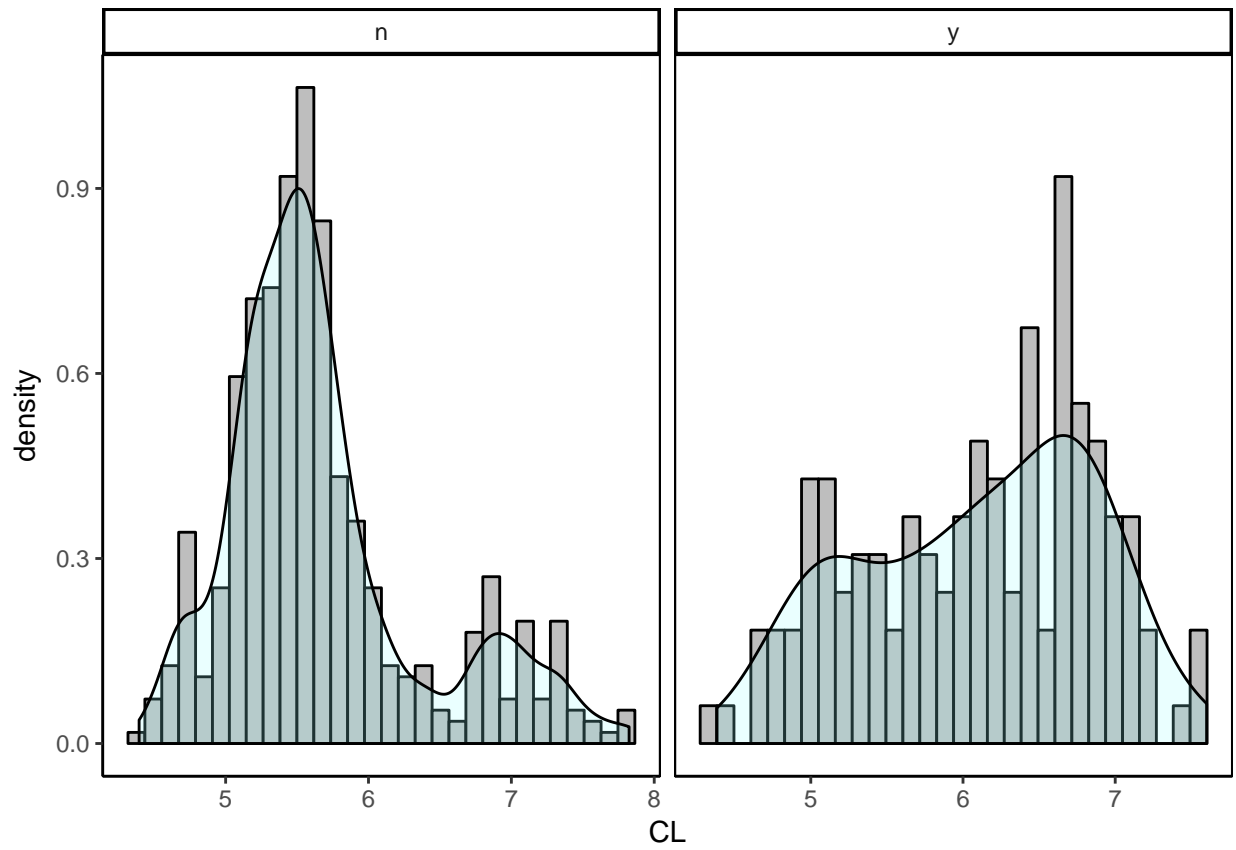


Figure 16: Distribution of body site data of continental (n) and insular(y) species, logtransformed.

continents

```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```

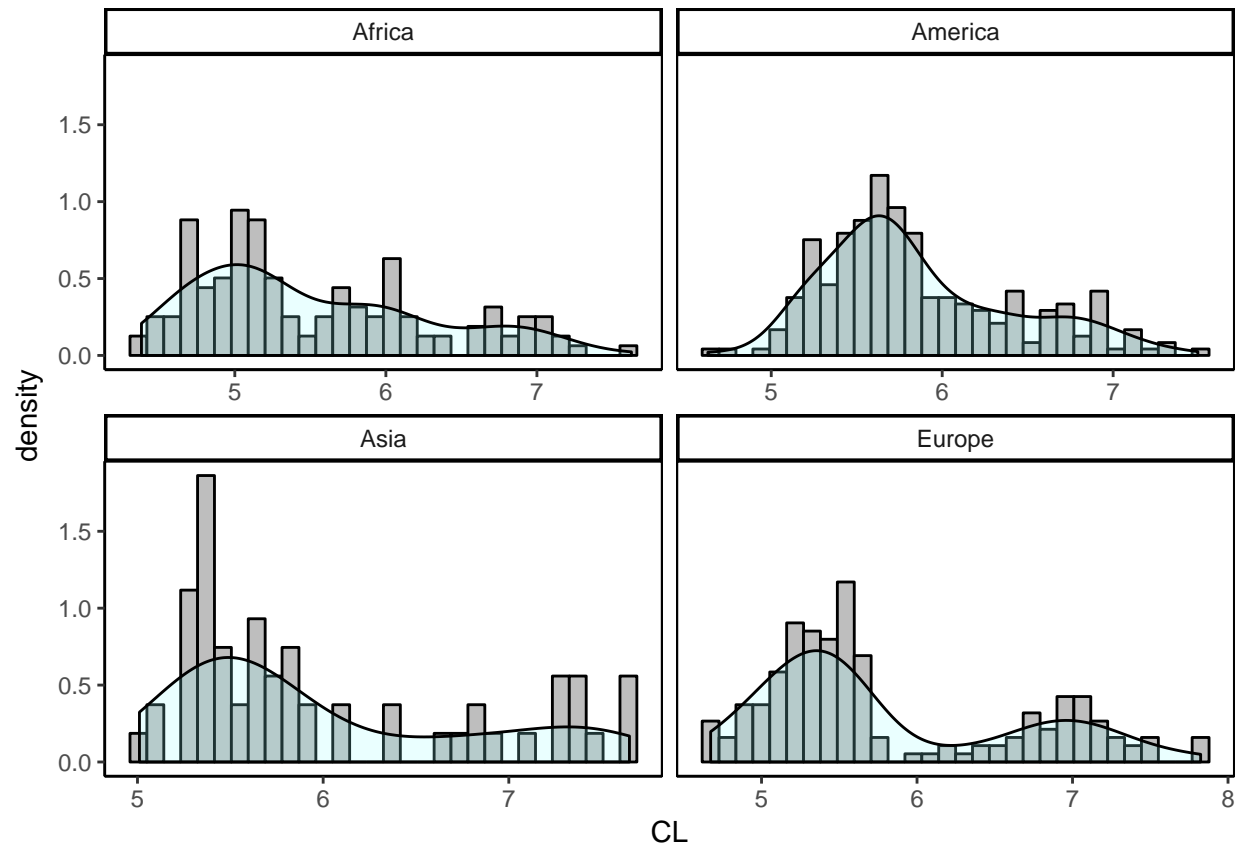


Figure 17: Distribution of body site data per continent, logtransformed.

General statistics

Table 6: General statistics of body size data: all, per time bin, insular and continental, per continent (all referring to CL: min, max, variance, mean, logmean, median, logmedian, skewness, logskewness, kurosis, logkurtosis)

nCL	min	max	var	mean	logm	med	logmed	skew	logsk	kurt	logku	Variable
616	80.00	2500	164537.80	437.2	2.5	270.5	2.4	2.14	0.69	8.00	2.73	all
253	80.00	1300	67485.50	330.3	2.4	242.0	2.4	1.83	0.58	5.87	2.69	Modern
49	102.44	1250	69690.66	445.9	2.6	334.7	2.5	1.20	0.24	3.61	2.56	Upper Pleistocene
53	132.00	1800	97910.83	387.1	2.5	292.9	2.5	3.03	1.52	12.24	5.55	Middle Pleistocene
57	107.80	2000	161948.82	463.5	2.5	263.0	2.4	1.74	0.73	5.76	2.40	Lower Pleistocene
31	118.90	2050	411224.51	555.2	2.5	194.9	2.3	1.31	0.93	3.12	2.11	Gelasian
21	90.00	1600	270535.82	610.6	2.6	428.0	2.6	1.00	0.14	2.50	1.99	Piacencian
26	176.00	2500	476162.71	955.2	2.9	857.5	2.9	1.11	-0.40	3.56	2.30	Zanclean
10	140.00	2100	602611.21	948.9	2.8	916.0	2.9	0.26	-0.22	1.49	1.29	Messinian
45	107.00	1540	175470.12	462.7	2.5	250.0	2.4	1.49	0.81	3.74	2.54	Tortonian
27	111.00	1500	126060.40	337.7	2.4	220.0	2.3	2.49	1.77	7.77	5.30	Serravallian
14	270.00	1600	230451.33	747.9	2.8	700.0	2.8	0.30	0.03	1.55	1.18	Langhian
30	113.00	1100	76288.76	406.8	2.5	302.4	2.5	1.27	0.45	3.45	2.26	Burdigalian/Aquitanian
253	80.00	1300	67485.50	330.3	2.4	242.0	2.4	1.83	0.58	5.87	2.69	Modern
363	90.00	2500	219004.66	511.7	2.6	285.6	2.5	1.83	0.68	6.11	2.42	Fossil
469	81.00	2500	157808.79	392.9	2.5	250.0	2.4	2.65	1.07	10.57	3.74	continental
147	80.00	2000	160834.35	578.5	2.6	500.0	2.7	1.02	-0.27	3.95	2.05	insular
157	81.00	830	17009.02	244.0	2.3	221.0	2.3	1.92	0.29	8.09	2.98	modern-con
96	80.00	1300	118641.09	471.5	2.6	353.0	2.5	0.82	0.01	2.47	1.77	modern-ins
312	90.00	2500	212116.79	467.9	2.5	270.0	2.4	2.11	0.96	7.25	2.96	fossil-con
51	150.00	2000	180825.40	780.0	2.8	750.0	2.9	1.11	-0.40	4.02	3.18	fossil-ins
142	80.00	2050	112417.26	347.7	2.4	193.5	2.3	2.10	0.68	7.97	2.48	Africa
242	102.44	1800	82209.71	415.0	2.5	302.2	2.5	1.92	0.75	6.79	2.91	America
59	150.00	2100	323123.20	585.5	2.6	280.0	2.4	1.43	0.85	3.61	2.24	Asia
173	107.00	2500	254222.84	491.2	2.5	245.0	2.4	1.86	0.81	6.30	2.34	Europe

nCL	min	max	var	mean	logm	med	logmed	skew	logsk	kurt	logku	Variable
-----	-----	-----	-----	------	------	-----	--------	------	-------	------	-------	----------

Boxplots

genera per time bins

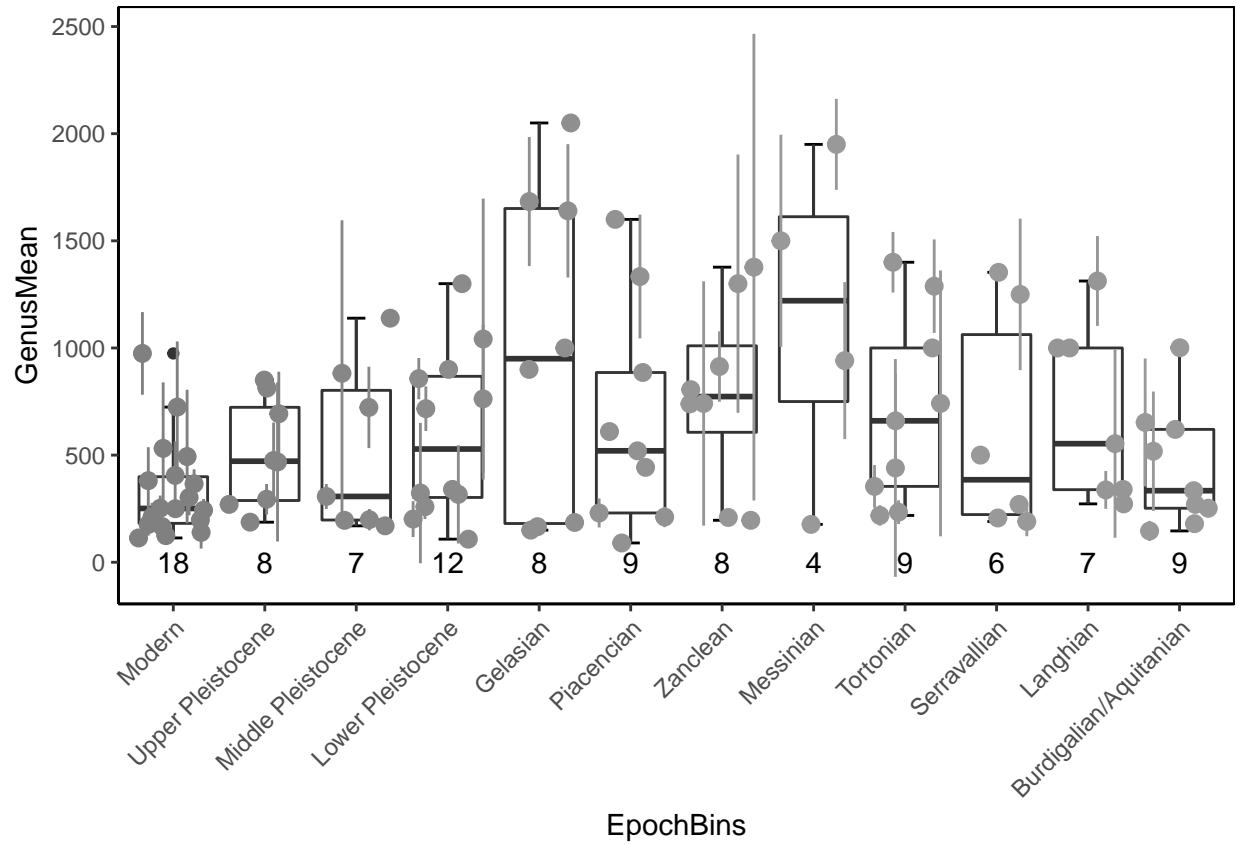


Figure 18: Boxplots of mean CL per time bin, including mean and sd CL for each genus (as pointrange).

continental vs. insular per time bin

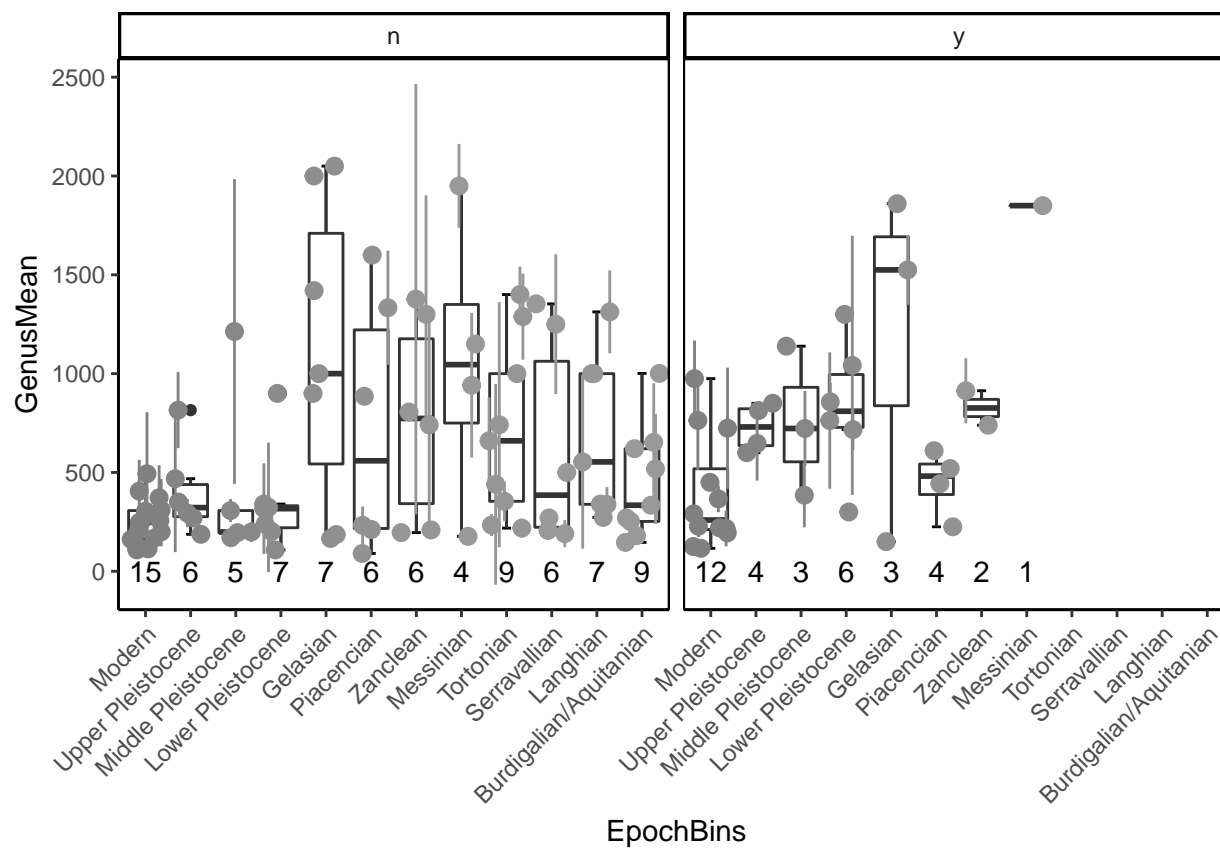


Figure 19: Boxplots of each genus per time bin, continental vs. insular species.

fossil vs. modern

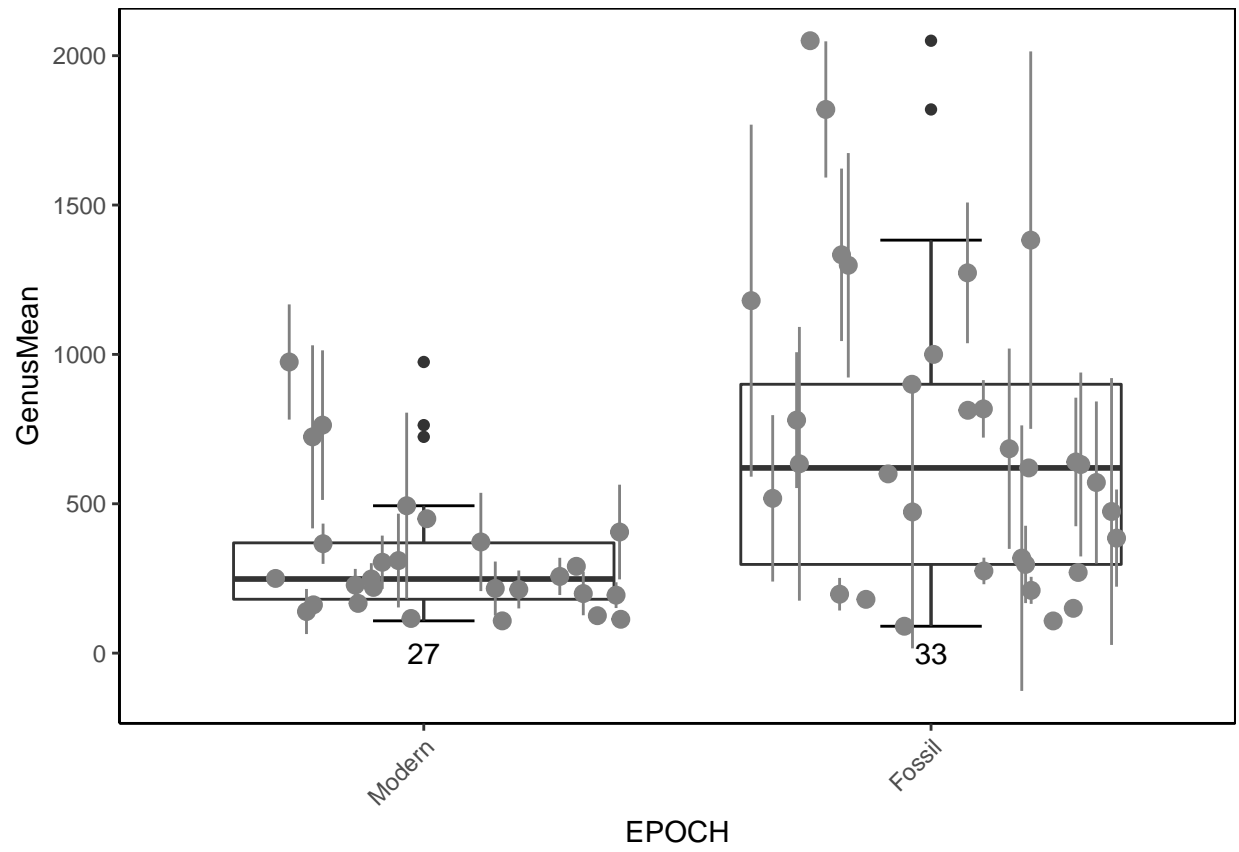
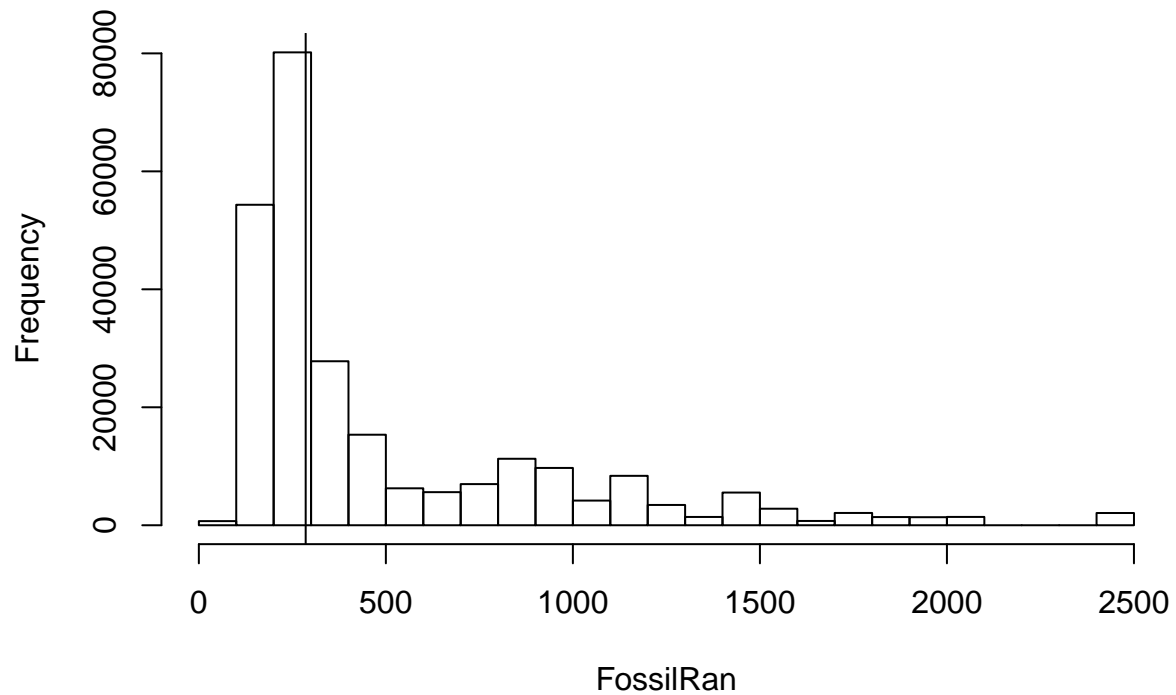


Figure 20: Boxplots fossil vs. modern.

Fossil, random sampling



```
## [1] 330.3495
```

```
## [1] 522.8435
```

```
##
```

```
## Wilcoxon rank sum test with continuity correction
```

```
##
```

```
## data: Modern and Fossil
```

```
## W = 23846, p-value = 6.624e-07
```

```
## alternative hypothesis: true location shift is less than 0
```

Wilcoxon Rank Sum Test (unpaired data):

modern < fossil ($P = 6.6241216 \times 10^{-7}$)

fossil vs. modern, continental vs. insular

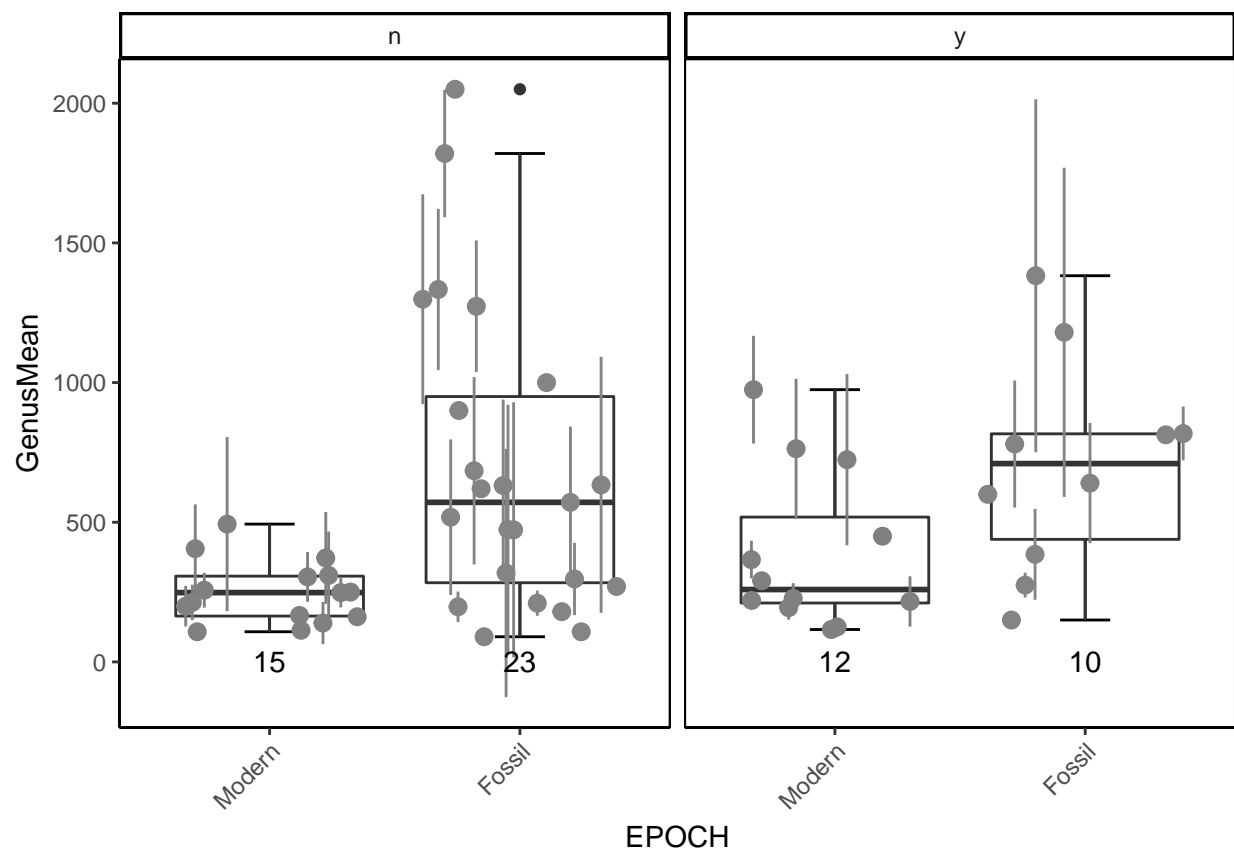
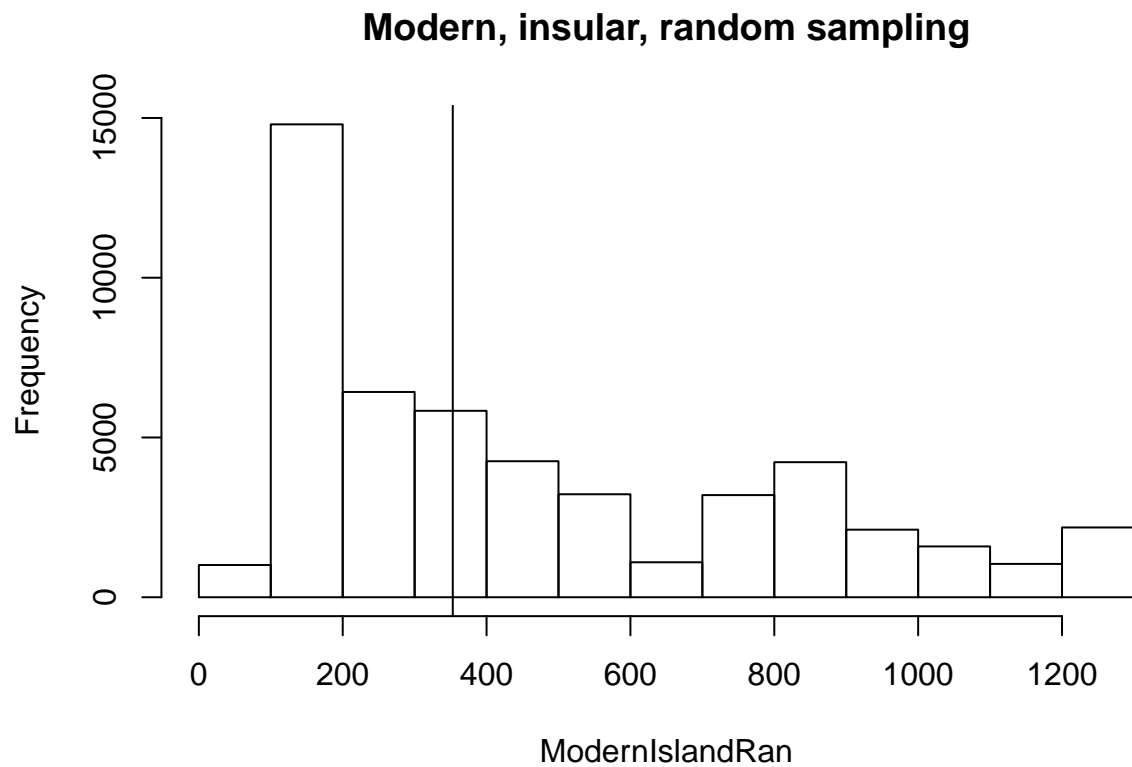


Figure 21: Boxplots fossil vs. modern, continental vs. insular species.

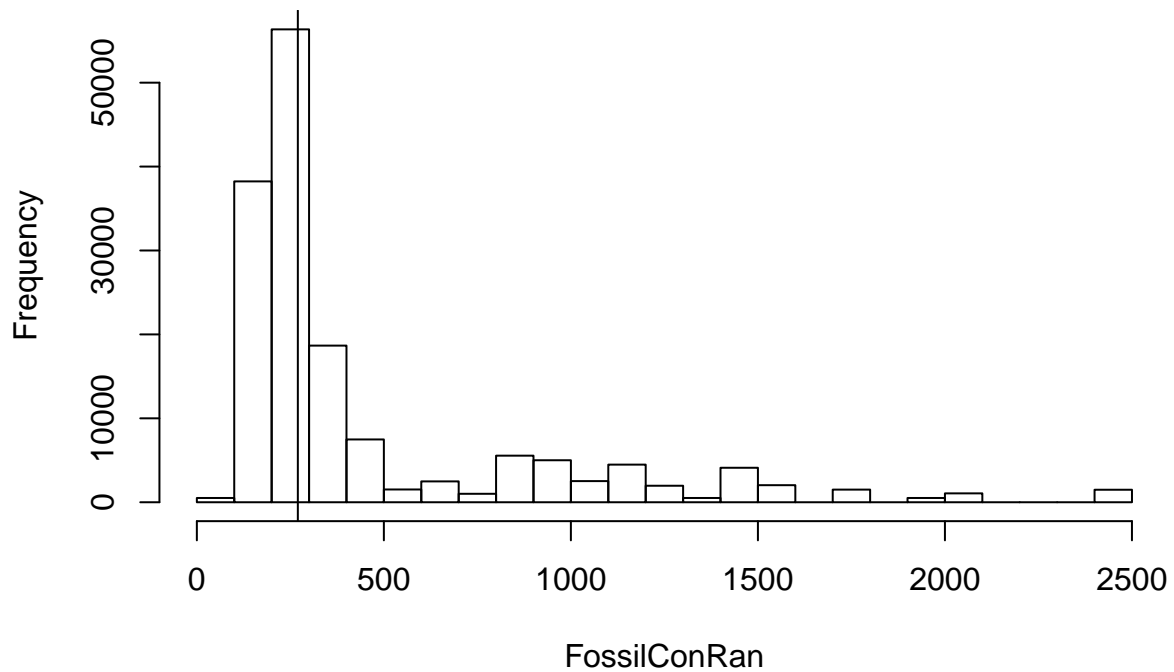
[1] 51

[1] 51



```
##  
## Wilcoxon rank sum test with continuity correction  
##  
## data: ModernIsland and FossilIsland  
## W = 767, p-value = 0.0001801  
## alternative hypothesis: true location shift is less than 0  
  
## [1] 157  
  
## [1] 157
```

Fossil, continental, random sampling



```
##
## Wilcoxon rank sum test with continuity correction
##
## data: ModernCon and FossilCon
## W = 7883.5, p-value = 1.69e-08
## alternative hypothesis: true location shift is less than 0
```

Wilcoxon Rank Sum Test (unpaired data):

modern continental < fossil continental ($P = 1.6898718 \times 10^{-8}$)

modern insular < fossil insular ($P = 1.8010082 \times 10^{-4}$)

continental vs. insular

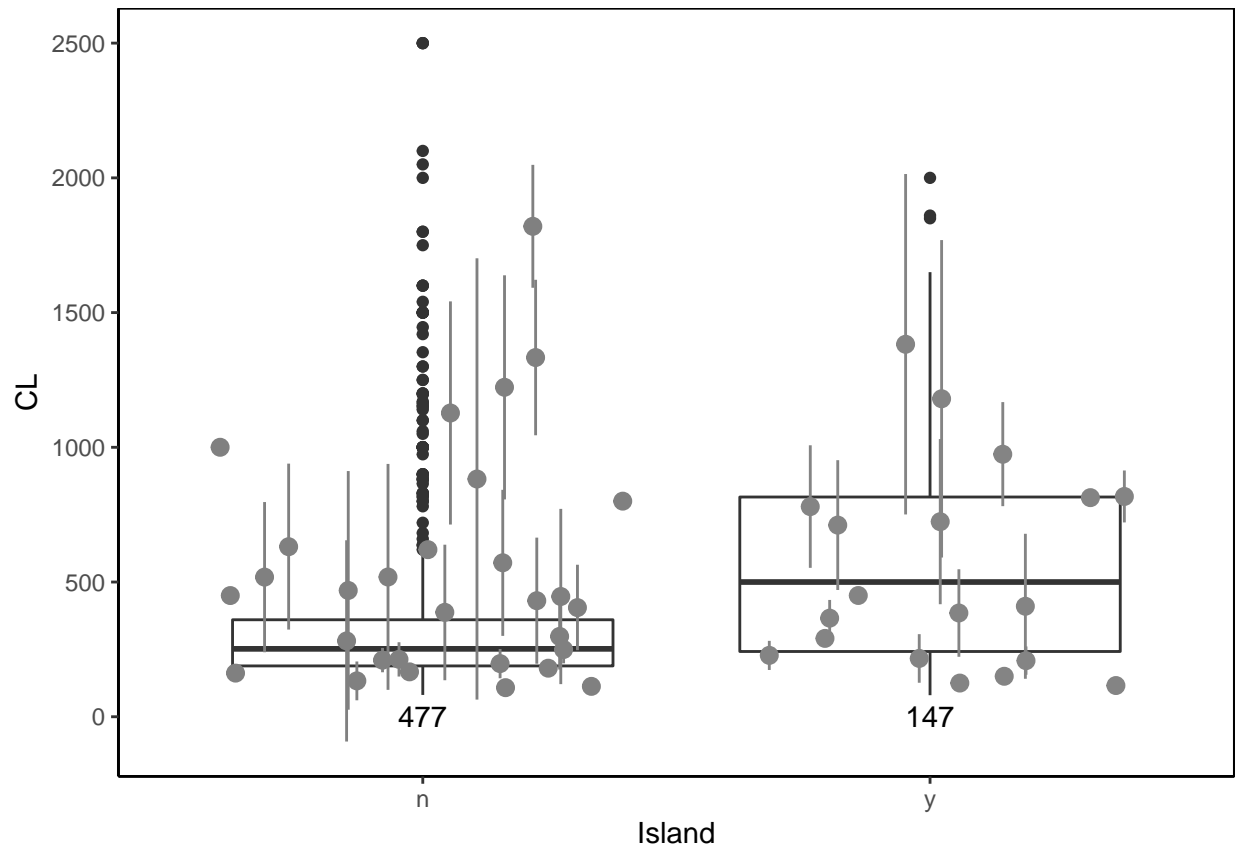
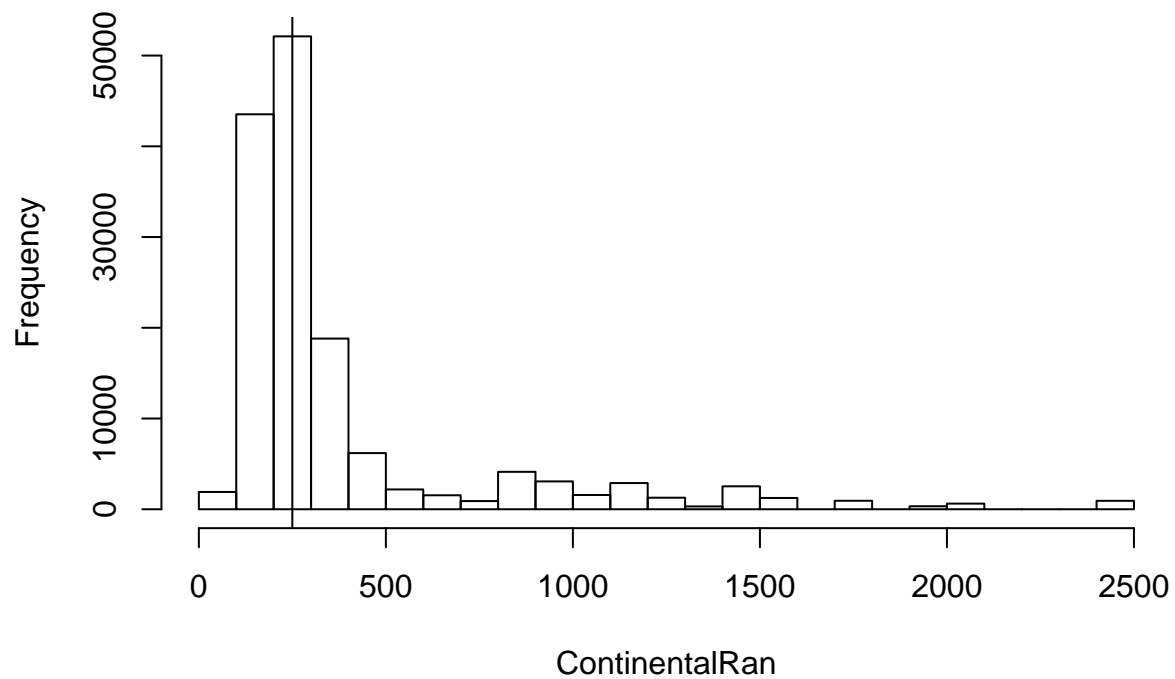


Figure 22: Boxplot continental vs. insular, genera summarised

```
## [1] 147
```

```
## [1] 147
```

Continental, random sampling



```
##  
## Wilcoxon rank sum test with continuity correction  
##  
## data: Insular and Continental  
## W = 13723, p-value = 3.118e-05  
## alternative hypothesis: true location shift is greater than 0
```

Wilcoxon Rank Sum Test (unpaired data):

continental < insular ($P = 3.1181418 \times 10^{-5}$)

continental vs. insular per time bin

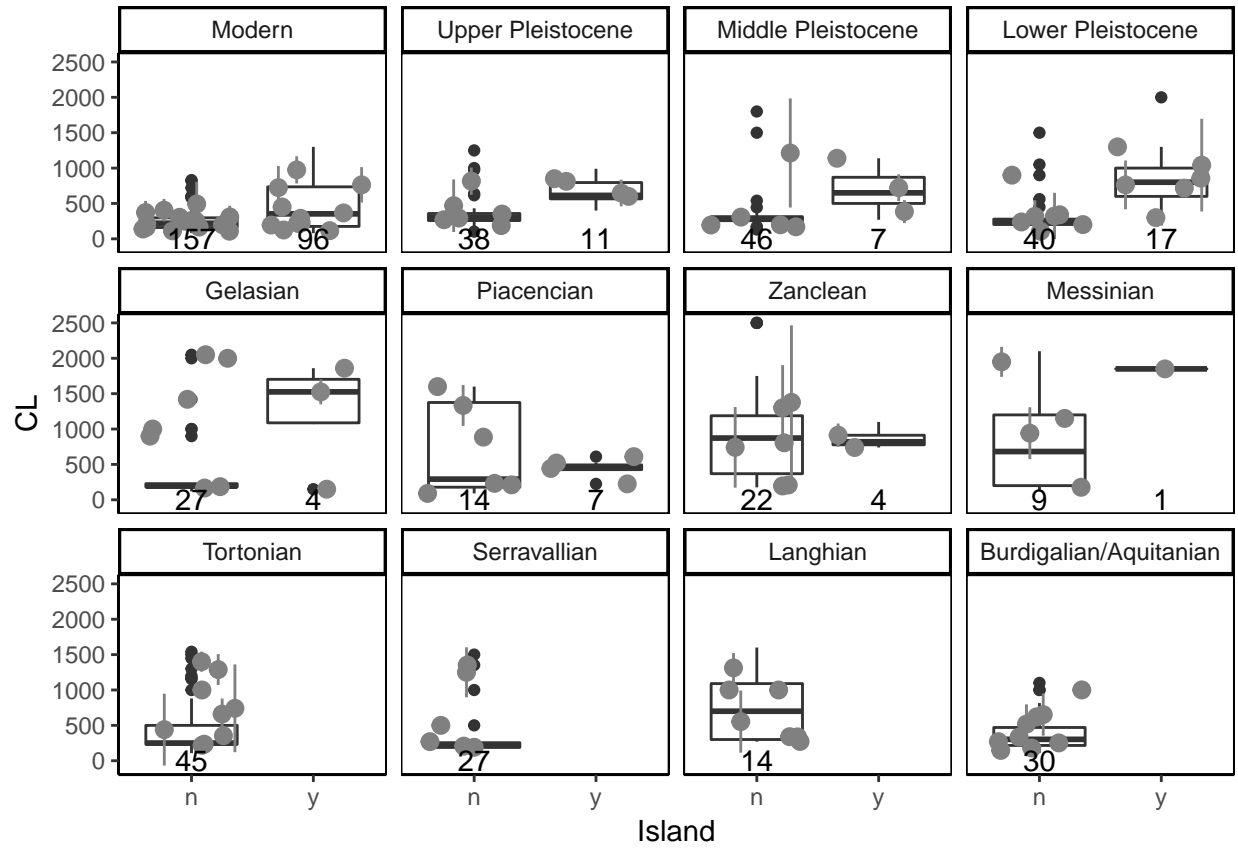


Figure 23: Boxplot continental vs. insular, genera summarised

continents

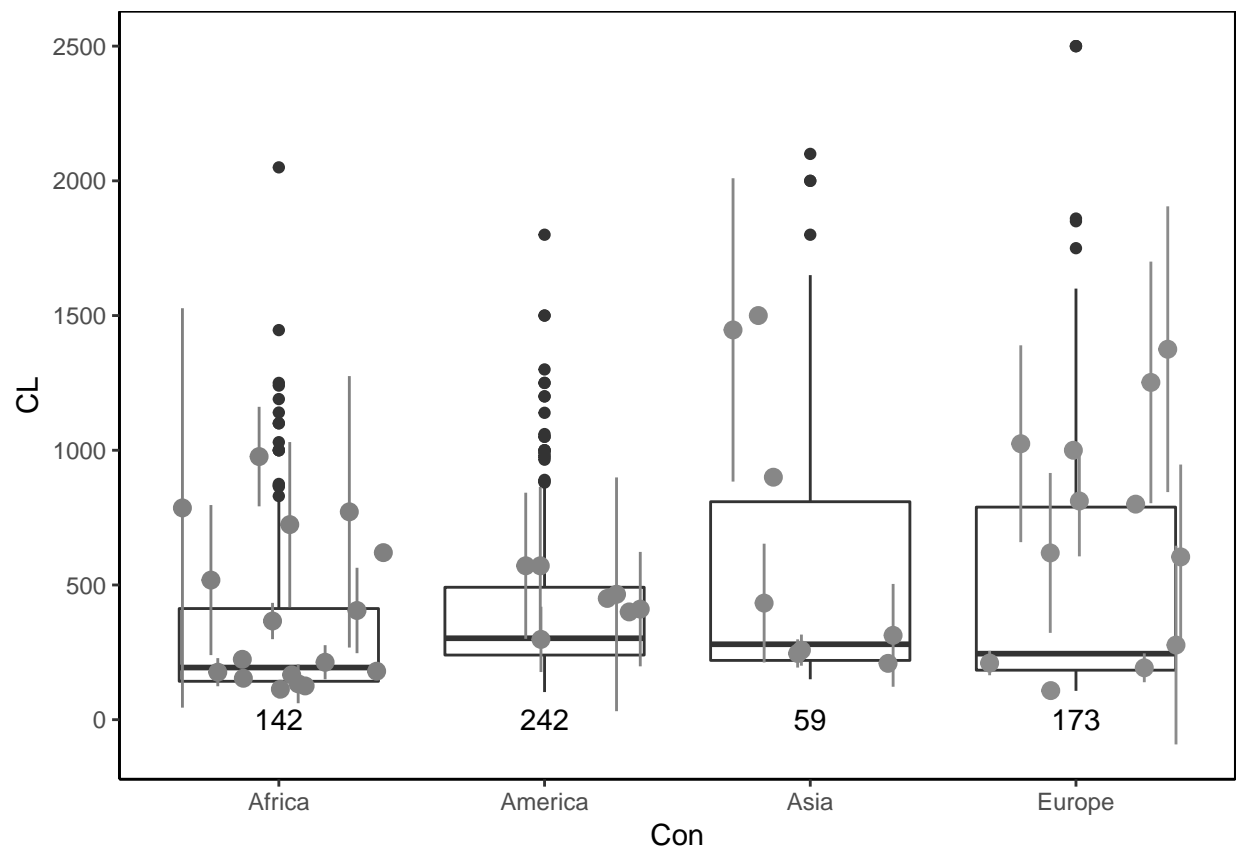


Figure 24: Boxplot: body size on different continents, genera summarised

[1] 142

[1] 347.6887

[1] 142

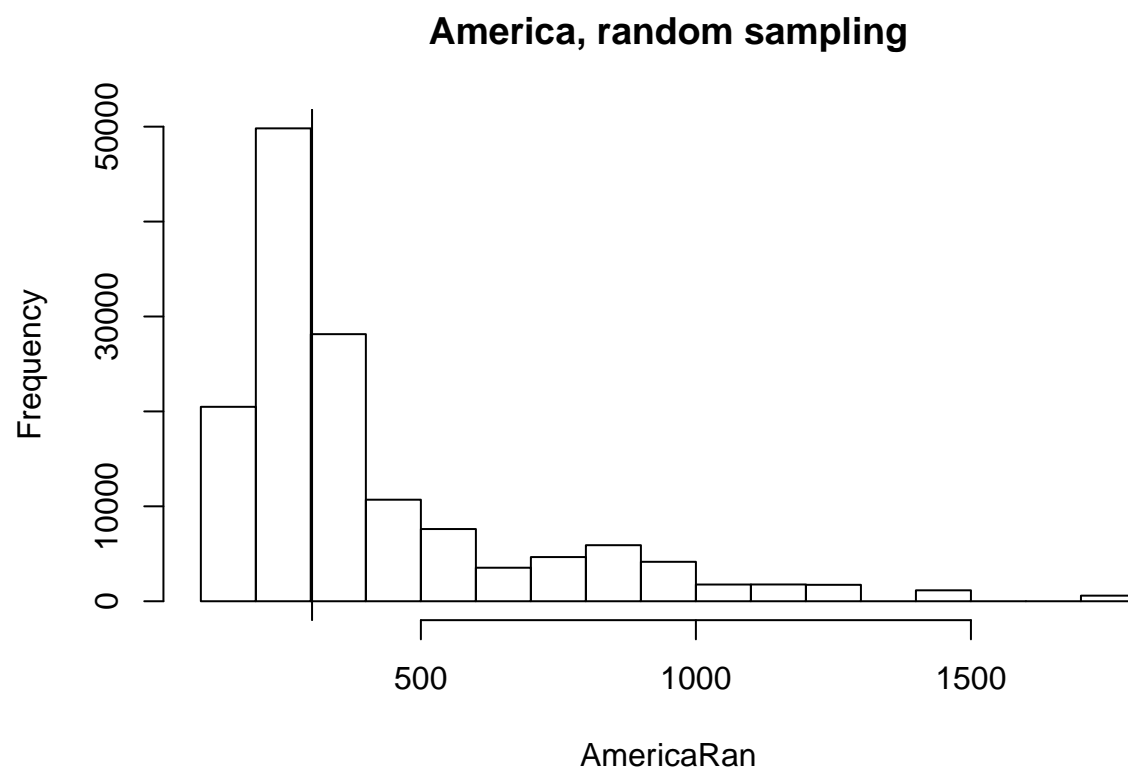
[1] 416.1407

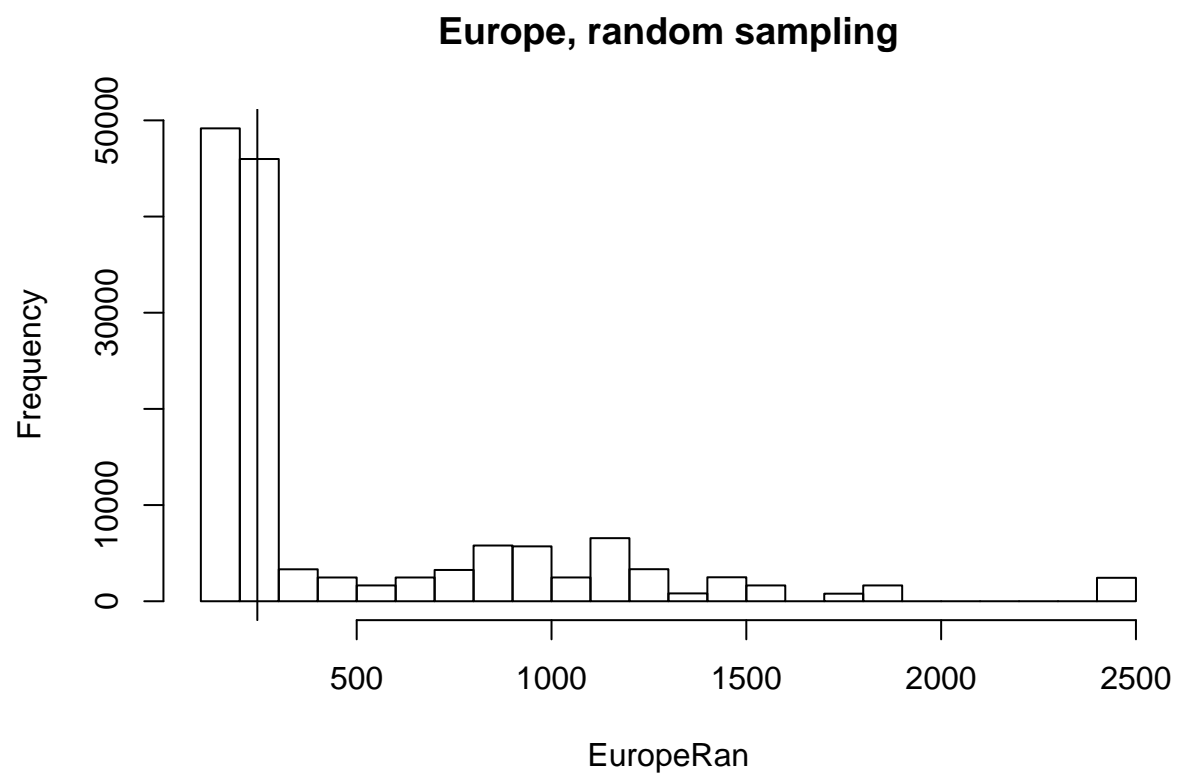
[1] 59

[1] 173

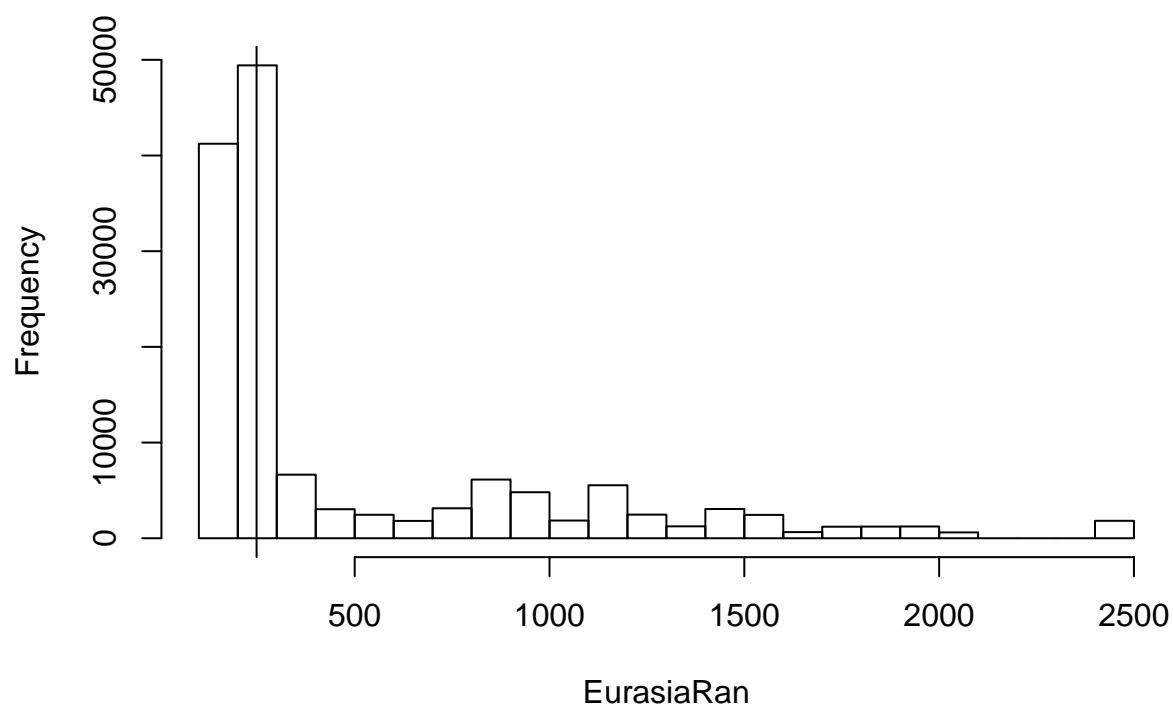
[1] 142

[1] 517.4296





Eurasia, random sampling



```
##
```

```
## Kruskal-Wallis rank sum test
```

```
##
```

```
## data: list(Africa, America, Eurasia, Europe)
```

```
## Kruskal-Wallis chi-squared = 32.839, df = 3, p-value = 3.483e-07
```

Kruskal-Wallis-Test:

Continent means differ ($P = 3.4831602 \times 10^{-7}$) (still have to look into the details...)

continents, continental vs. insular

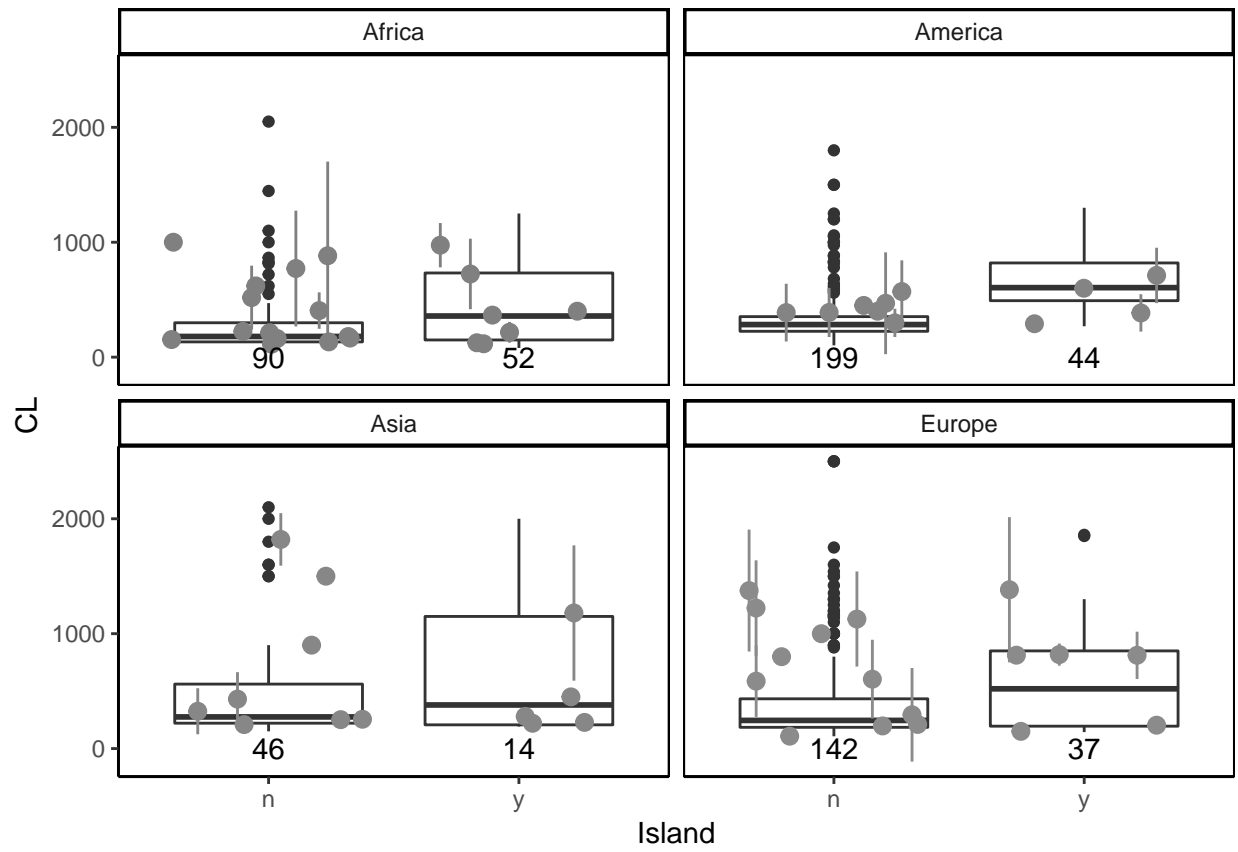


Figure 25: Boxplot: body size on different continents, genera summarised

paleoTS analysis

all (continental and insular)

genera (all)

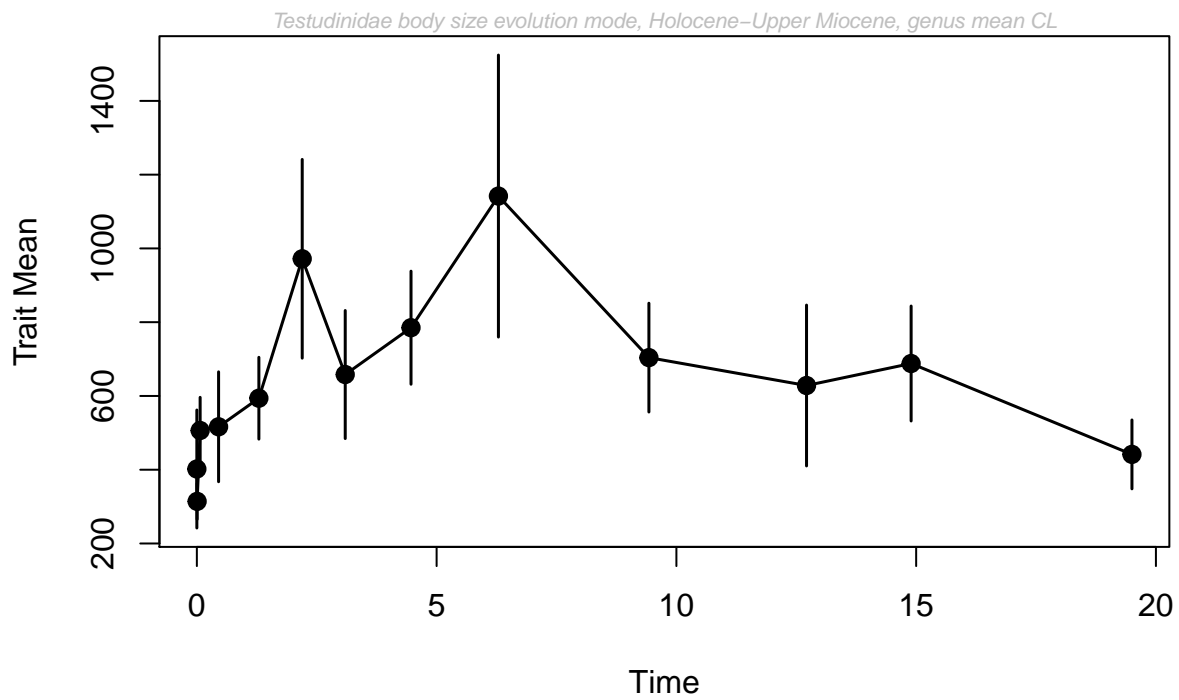


Figure 26: paleoTS plot with genus mean, including island species

Table 7: Model-fitting results for testudinidae, genera, including island species

	logL	K	AICc	Akaike.wt
GRW	-81.31790	2	167.9691	0.161
URW	-82.05721	1	166.5144	0.332
Stasis	-80.16802	2	165.6694	0.507

continental (excluding insular species)

genera (continental)

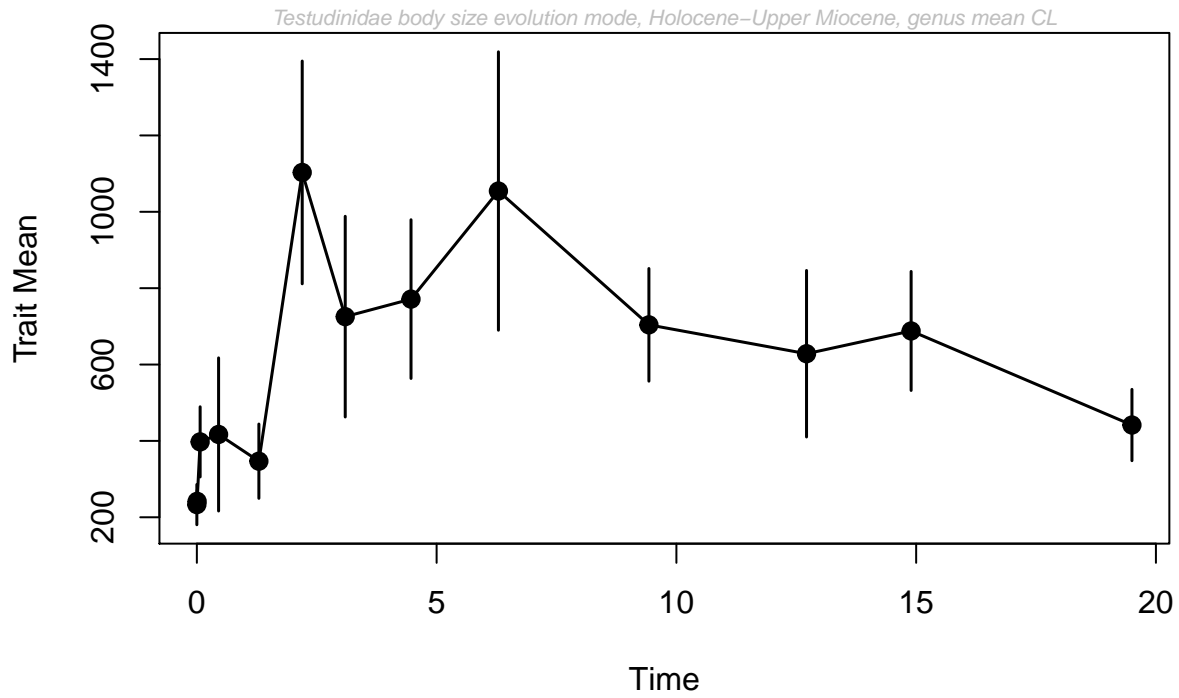


Figure 27: paleoTS plot with genus mean, excluding island species

Table 8: Model-fitting results for testudinidae, genera, excluding insular species

	logL	K	AICc	Akaike.wt
GRW	-82.26287	2	169.8591	0.300
URW	-83.12577	1	168.6515	0.548
Stasis	-82.93984	2	171.2130	0.152

insular (excluding continental)

genera (insular)

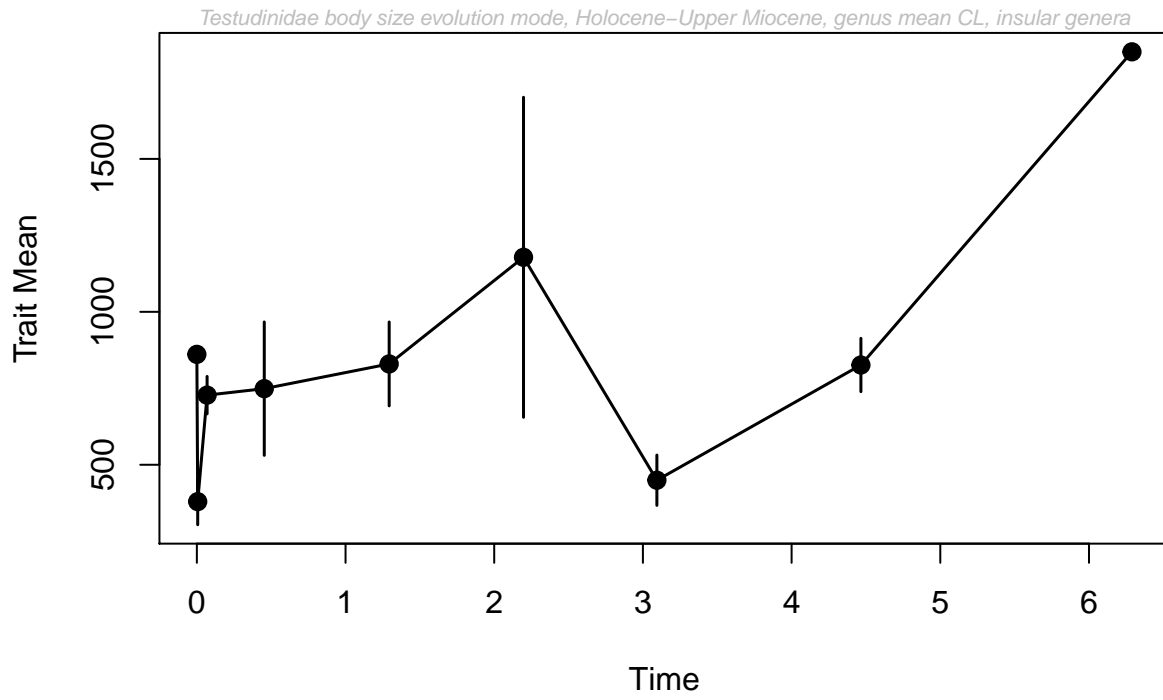


Figure 28: paleoTS plot with genus mean, only insular species

Table 9: Model-fitting results for testudinidae, genera, only insular species

	logL	K	AICc	Akaike.wt
GRW	-68.57344	2	143.5469	0
URW	-75.76576	1	154.1982	0
Stasis	-60.41581	2	127.2316	1

per continent

Europe, smaller original bins (see Table 2), genera

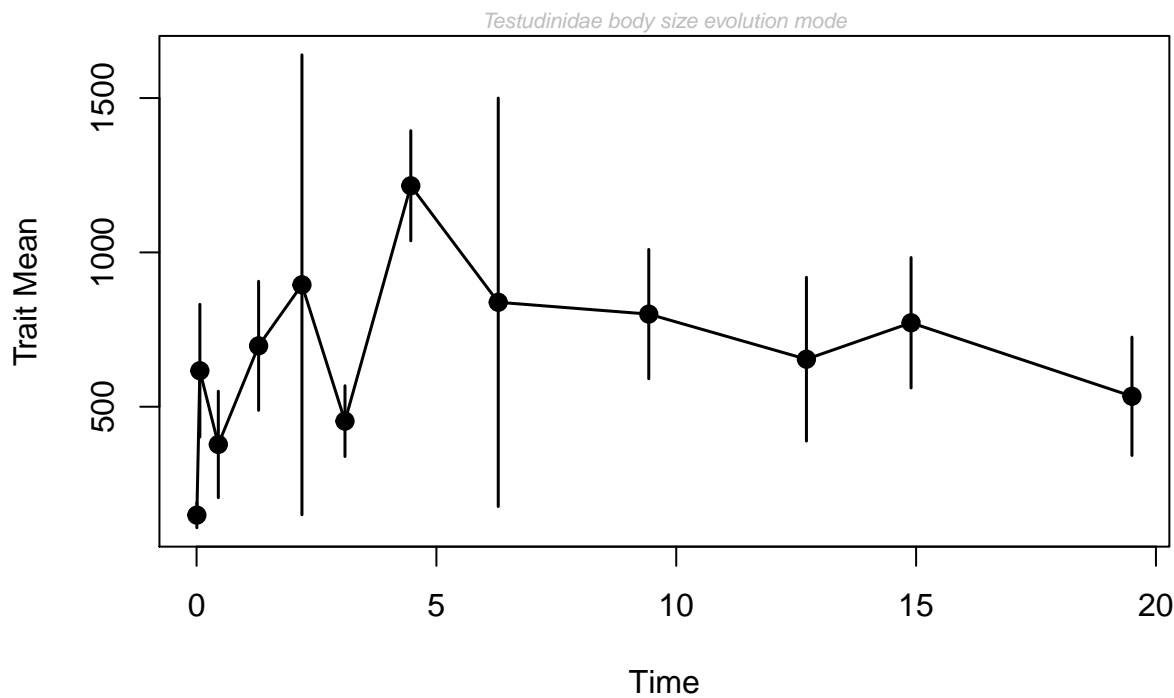


Figure 29: Smaller original bins, genera, Europe

Table 10: Model-fitting results for testudinidae, no bins, genera

	logL	K	AICc	Akaike.wt
GRW	-84.14010	2	173.7802	0.006
URW	-85.90727	1	174.2590	0.005
Stasis	-79.01365	2	163.5273	0.990

Europe, smaller original bins (see Table 2), genera, continental

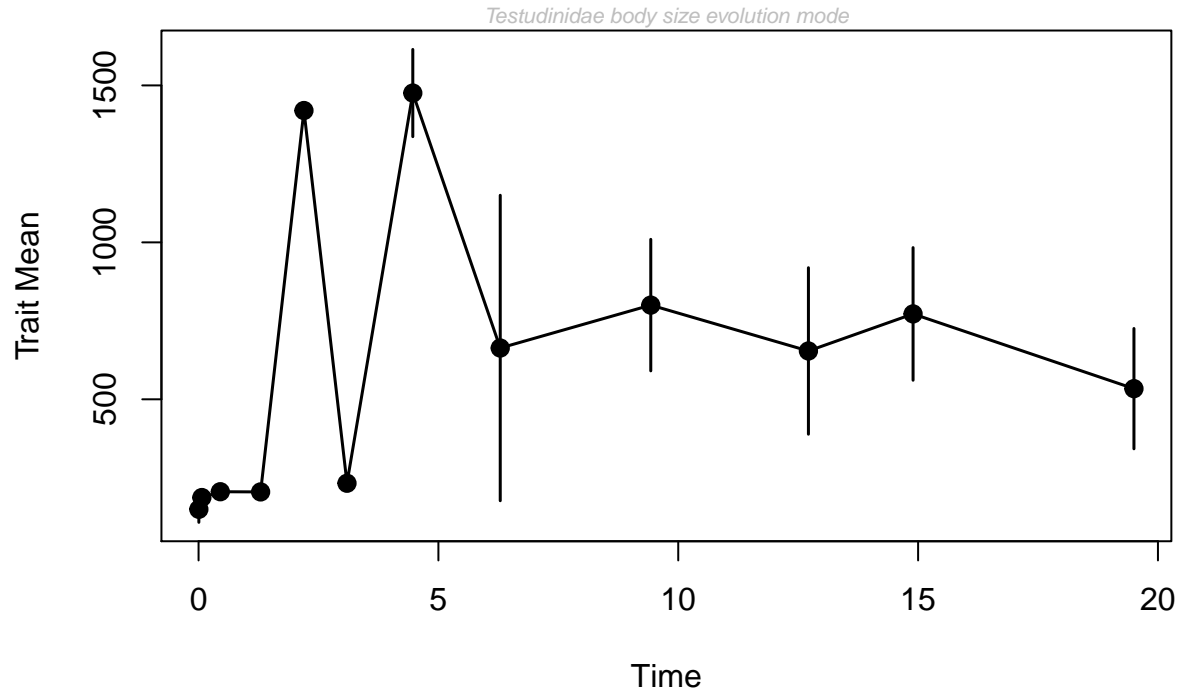


Figure 30: Smaller original bins, genera, Europe, continental

Table 11: Model-fitting results for testudinidae, no bins, genera

	logL	K	AICc	Akaike.wt
GRW	-87.93137	2	181.3627	0.009
URW	-92.56882	1	187.5821	0.000
Stasis	-83.21073	2	171.9215	0.991

Europe, smaller original bins (see Table 2), genera, insular

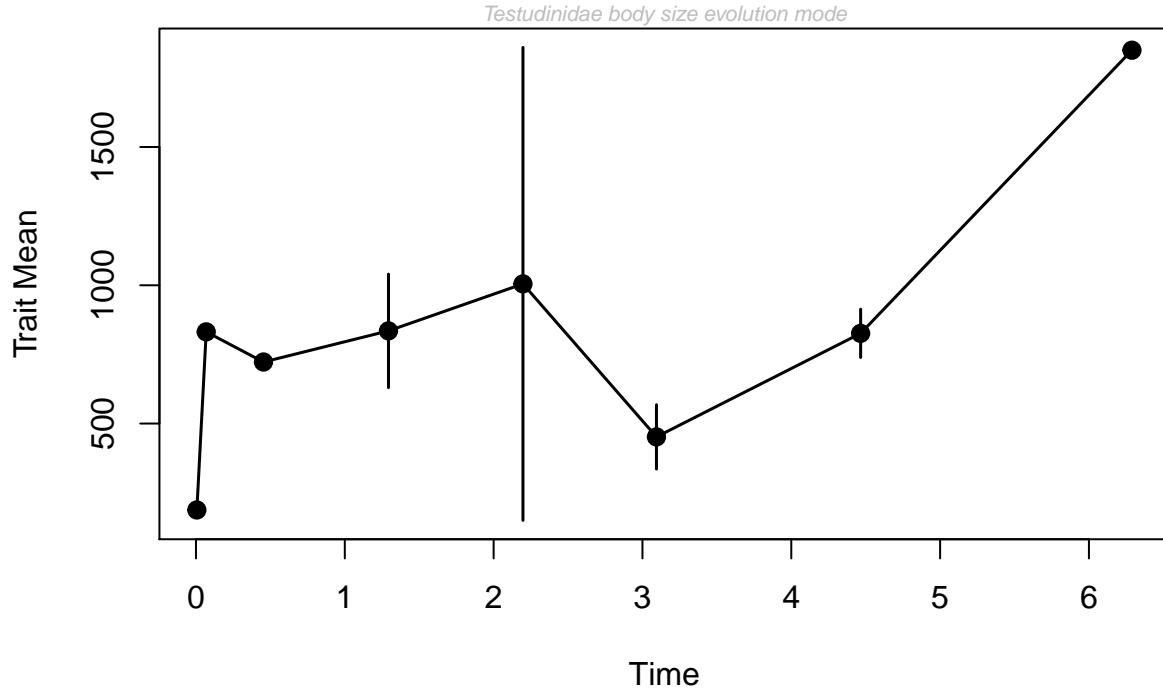


Figure 31: Smaller original bins, genera, Europe, insular

Table 12: Model-fitting results for testudinidae, no bins, genera

	logL	K	AICc	Akaike.wt
GRW	-67.12192	2	141.2438	0.000
URW	-57.51634	1	117.8327	0.074
Stasis	-52.89638	2	112.7928	0.926

Eurasia, smaller original bins (See Table 2), genera

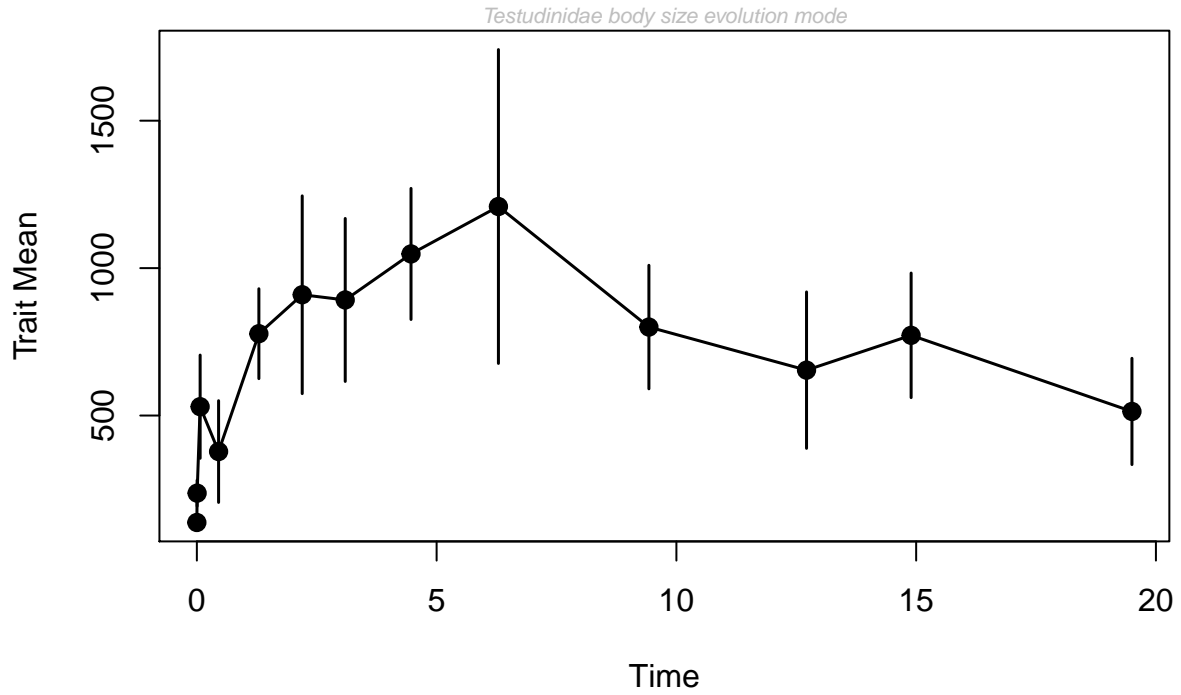


Figure 32: Smaller original bins, genera, Eurasia

Table 13: Model-fitting results for testudinidae, no bins, genera

	logL	K	AICc	Akaike.wt
GRW	-85.25195	2	175.8372	0.149
URW	-85.39072	1	173.1814	0.562
Stasis	-84.58890	2	174.5111	0.289

Eurasia, smaller original bins (See Table 2), genera, continental

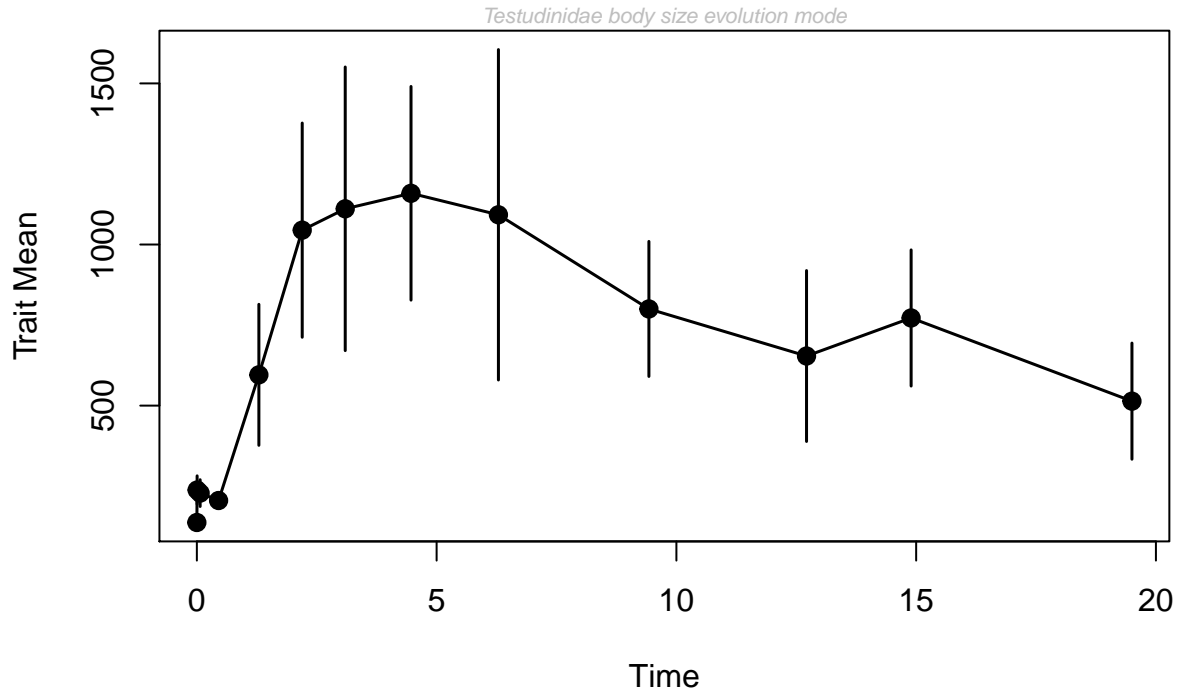


Figure 33: Smaller original bins, genera, Eurasia, continental

Table 14: Model-fitting results for testudinidae, no bins, genera

	logL	K	AICc	Akaike.wt
GRW	-82.20698	2	169.7473	0.222
URW	-82.42344	1	167.2469	0.776
Stasis	-87.19538	2	179.7241	0.002

Eurasia, smaller original bins (See Table 2), genera, insular

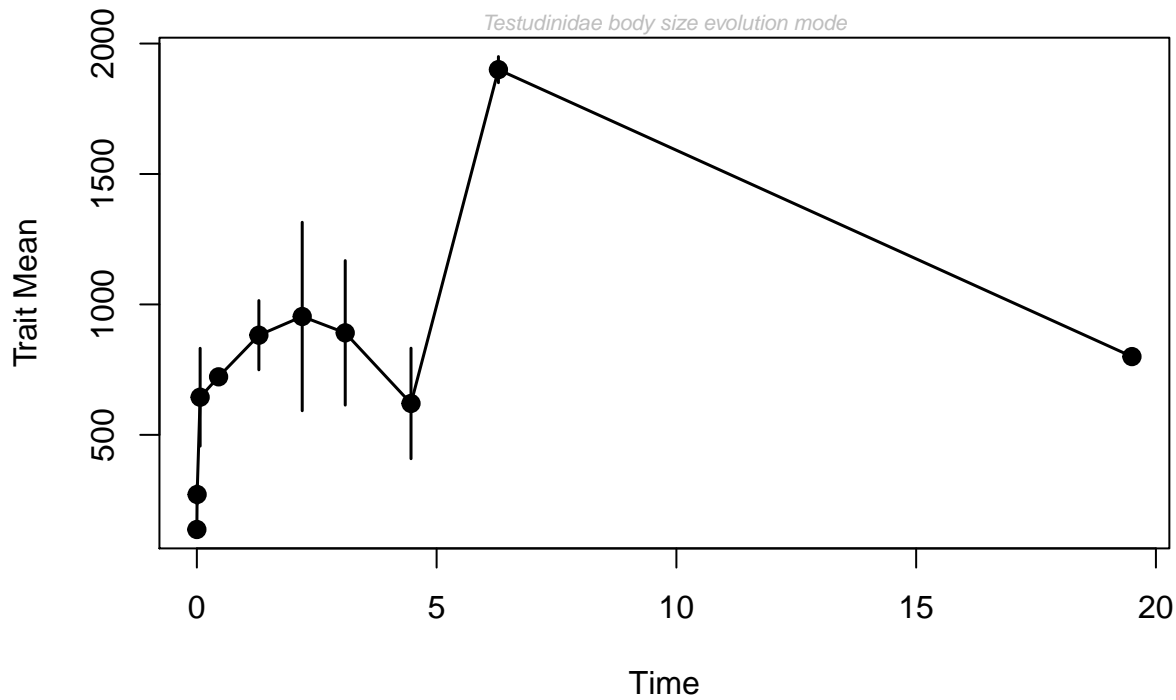


Figure 34: Smaller original bins, genera, Eurasia, insular

Table 15: Model-fitting results for testudinidae, no bins, genera

	logL	K	AICc	Akaike.wt
GRW	-69.56419	2	145.1284	0.193
URW	-71.67437	1	145.9202	0.130
Stasis	-68.31026	2	142.6205	0.677