Electronic Supplementary Materials for "Primates follow the Island Rule: implications for interpreting Homo floresiensis"

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Contents of Electronic Supplementary Material

1.1 <u>Selection of comparisons between island and mainland primates</u>

Our aim was to select independent instances of the evolution of island endemic primate populations. To this end, we needed to establish:

(a) populations of primates living on islands that were reported to be distinct from their mainland relatives, indicating a sufficient degree of genetic isolation from the mainland population to permit the potential evolution of body size;

(b) the closest mainland relative of each island endemic population, to act as a comparison for the evolution of body size;

(c) comparable body size data for both members of each comparison.

(a) Island endemic primates

We searched the literature and online databases and consulted experts to identify species, sub-species or distinct populations of island endemic primates. Because there is no single accepted taxonomy for primates, we accepted any population reported to be consistently and recognizably different from the mainland populations, regardless of formal taxonomic status (which can vary between authors). For example, Ambrose (Ambrose, 2003) demonstrated that the Bioko Island form of the bushbaby *Galago alleni* differs from the Cameroon and Gabon populations on the basis of morphology, pelage, body size and variation in call use. These three populations of *Galago alleni* are represented as a single species in some sources and as separate species in other treatments, so here we simply report the taxon names as given in the source publication as "*Galago alleni* 1a" and "*Galago alleni* 1b" (Ambrose, 2003). As long as the island population is distinct from the mainland populations, it is not important for the purposes of this study what their current taxonomic status is.

These selection criteria should not bias the current study. Firstly, selecting only distinct island taxa should not bias the test in favour of any particular body size change: if the island rule did not hold, then each island taxon should have an equal chance of being either smaller or larger than the mainland taxon. Comparisons were chosen before any body size data were recorded to avoid the possibility of taxon selection bias. Secondly, if the taxa included here do not represent truly isolated populations, then this should weaken the signal for any island effect, as island populations undergoing gene flow with mainland populations should have less chance of developing island-specific characteristics. For example, if the Bioko Island Bushbaby is really a continuation of the Cameroon population, then we would expect gene flow to reduce the possibility of the Bioko Island population showing an insular shift in body size.

(b) Mainland relatives

We selected related pairs of island and mainland taxa with the aim of comparing phylogenetically independent instances of island endemism, such that each island endemic taxon in the data set is compared to a different closely-related mainland population. In this way, each comparison represents a separate test of the island rule, and can be used as independent points in a statistical analysis. Ideally, the comparisons should be chosen from a well-resolved phylogeny to ensure that they are phylogenetically independent (Felsenstein, 1985; Garland et al., 1992; Harvey & Pagel, 1991; Harvey & Purvis, 1991). For the body mass dataset, we selected comparisons based on published phylogenies (see references in Supplementary Table 1). However, there is no single accepted phylogeny of primates, and most of the island subspecies identified for this study are not included in any published phylogenetic studies. Therefore, to avoid biasing the dataset towards only

those groups with a published phylogeny, we used a combination of taxonomy, distribution data, and expert advice to select the most closely related mainland taxon for each of the island endemics in the body length dataset (see Supplementary Table 2 for sources). We made the assumption that taxonomic groups represented monophyletic groups, and chose no more than one comparison per genus or species-group. If phylogenies are later published for these groups we may have to revise our comparisons, however we are confident that we have made the best choices for independent pairs given the currently available data.

(c) Body size data

For both mass and length datasets, we preferentially chose taxa for which population averages for adult body size, or at least size measures for multiple specimens, were available. Where the range of size values was given, the midpoint was estimated using a geometric mean of the maximum and minimum of the range. Where there was more than one island endemic in a clade with available data, we chose the one with the most comprehensive body size data, or, if all had the same data availability, we chose the taxon restricted to the smallest or most remote island. Similarly, if there was more than one suitable mainland species, we chose the one with the most comprehensive available data or, if all had the same data availability, we selected the taxon with the widest distribution, or from the largest land area. We included only measurements from adults, not sub-adults or juveniles. In general, the measurements of mass are more reliable as they are commonly based on more specimens, however we have included length and skull measurements as well because they are available for a wider range of taxa (particularly because these measurements can be taken from museum specimens, unlike body mass). For some subspecies only the dimensions of the type specimen were available: these are marked in Supplementary Table 2. These taxa were included to avoid biasing the dataset towards large populations from well-studied islands (Lomolino, 2005). For the skull measurements, we aimed to compare only equivalent measures, usually taken from the same publication to ensure that the measurements were compatible. For two comparisons, we have used bizygomatic length rather than maximum length (marked in Supplementary Table 2). These comparisons were only used for analysis of the relative difference between island and mainland taxa, and were not included in the regression analyses. Where information was available, we recorded separate male and female sizes as well as the average body size. Male and female sizes are most likely to be reported for species with sexual dimorphism. While this ascertainment bias may reduce the power of the test, it should not bias this analysis as we compare relative degree of dimorphism only in comparisons for which data are available for both island and mainland taxa. Size dimorphism was calculated as the body size of the smaller sex

divided by the body size of the larger sex for each taxon for which separate male and female mass and head-body length were available.

Because we could only include taxa for which we could obtain appropriate body size data, we could not include all island endemic primates nor could we always include the nearest mainland relative. For example, for the length dataset (Supplementary Table 2), we compared the Peleng Tarsier *Tarsius pelengensis* to the Spectral Tarsier *Tarsius tarsier* (also referred to as *T. spectrum*). However, we were unable to obtain comparable body mass measures for both *T. pelengensis* and *T. tarsier,* so for the body size dataset we had to compare the Peleng Tarsier to a more distant relative, the Phillipine tarsier *Tarsius syrichta* (Supplementary Table 1). Use of a more distant relative is unlikely to bias our analysis, as it more likely to obscure the signal of an island effect, rather than produce a spurious association.

1.2 Statistical Analyses.

We used a variety of statistical approaches to test for the existence and form of the island rule in primates. Firstly, if there is no island effect, the proportion of island-mainland comparisons in which the island taxon is smaller should be approximately 50%. We used Sign Tests to test for significant deviations from this expectation. This is a conservative test for the island rule which makes minimal assumptions about the data or the processes of body size evolution. To take into account the magnitude as well as the direction of the changes in body size, we used Wilcoxon Signed-Ranks Tests. To measure the magnitude of body size change for each comparison, we calculated body size ratios by dividing the size of the smaller species by the size of the larger species, then scoring the comparison positive if the island species was smaller, negative if the mainland species was smaller. The island rule predicts a change in the direction of the body size shift between small- and large-bodied species. We therefore first carried out the above tests using all comparisons, then repeated the tests excluding small species. Following Lomolino (2005) we considered a species to be "small" if it fell below the value at which the ratio of island to mainland body size is predicted to be 1: for our data, this value is approximately 5kg, or 200mm in length, or 50 mm skull length.

In addition to the Sign and Wilcoxon tests, we performed reduced major axis (RMA) regressions of island against mainland body size, and tested whether the slope of the regression line was significantly different from one. A significant result indicates that island body sizes differ in a consistent direction from the mainland relatives. Most studies of the island rule use a different approach, calculating the ratio of island population to mainland population body size (termed S_i:

Lomolino, 2005), then regressing this ratio against body size of the mainland taxon. This procedure has been criticized, because of the statistical problems associated with regressing a ratio against its denominator. We do not rely on that test here: our results stand on pairwise tests of island vs mainland size (for signs tests, Wilcoxon tests and regressions). However we include regression of S_i against mainland body size in the supplementary information in order to provide a comparison with other studies of the island rule: see Supplementary Table 4 and Supplementary Figure 2.

In addition to testing the significance of the association between mainland population size and S_i using reduced major axis (RMA) regression, we test the robustness of this association by comparing t-values from the regression to a distribution of t-values obtained from a randomization test. This was done as follows: for each mainland taxon, an island taxon size was randomly chosen by sampling from a normal distribution with a mean equal to the mainland population body size, and standard deviation equal to a given proportion of the mean. These proportions were determined empirically for each comparison from the frequency distribution of published body size values for each primate family. For each set of random samples obtained in this way, we calculated the t-value from a linear regression, and used the distribution of 10,000 random regression t-values to obtain the significance of the observed t-value. This null model thus assumes only that when an island population becomes isolated from its mainland source, a body size shift in either direction is equally likely, and smaller shifts are more likely than larger shifts. We recognize that other models of body size evolution (e.g. directional selection) are possible, but they require extra assumptions to be made and we consider ours to be the most appropriate null model for the association between S_i and mainland body size. See Supplementary Table 3 for results of these regressions.

1.3 Comparison of *Homo floresiensis* to other hominids

This study was motivated by a desire to provide a comparative study of island primates against which claims for island dwarfing of hominids could be compared. While our data consist solely of non-human primates, we commented in the discussion on the inferred degree of dwarfism observed in *Homo floresiensis*. Here, we provide details of the data used to make this comparison, but we caution that these data are used for illustrative purposes only and were not used in any of the statistical analyses of island primates presented in the main text.

In order to judge whether *Homo floresiensis* fits within the broader pattern of body size evolution in insular primates, we need to compare *H. floresiensis* to its nearest mainland relative. However, the closest relative of *H. floresiensis* is a matter of debate (Argue et al., 2006; Brown et al., 2004; Falk et al., 2005). Therefore, we have compared *H. floresiensis* to three different hominids, to represent

three different scenarios for the evolution of *H. floresiensis*: *Australopithecus* (Argue et al., 2006) here represented by *A. afarensis* due to data availability), *Homo erectus* (Brown et al., 2004; Falk et al., 2005), and *Homo sapiens* (Jacob et al., 2006; Richards, 2006). This is not an exhaustive list of possible close relatives, but these three species were chosen to maximise data availability and to give a range of possible ancestral sizes for *H. floresiensis*. Because the dimensions of *H. floresiensis* are reported for a putative female specimen (LB1), and given that modern humans are sexually dimorphic, we would ideally compare LB1's dimensions only to those from other female hominids to avoid the results being skewed by sexual dimorphism. However, most average skull and stature estimates in the literature are averages for all specimens. We should consider these measures to be an overestimate of the size difference between *H. floresiensis* and other hominids, making these figures conservative for testing for possible size reduction in the Flores hominids.

Length measurements for other primate species are given as head-body length, which is not reported for hominids. It is difficult to obtain a comparable measure from hominid stature data. However, we have estimated sitting height for each of the hominid species from their predicted stature, using the formula provided by Bardeen (1923) and the co-efficient he gives for modern Javanese *Homo sapiens*. As a comparison, we calculated sitting height from an average sitting height to standing height ratio for a modern European population (Fredriks et al., 2005), and found that although absolute measures differed slightly, the relative size differences between taxa were similar. Note that these formulae may not accurately predict sitting height in extinct hominids which had different limb proportions than modern humans, however they are used here only to give a rough indication of relative size.

A. *Homo floresiensis* (LB1: mass 27kg, head-body length 615mm, skull length 143mm) vs. *Australopithecus afarensis* (female mass 29kg, female head-body length 611mm, average head-body length 697mm, average skull length 146mm) [Sources: Ref 1-3 (see below)]

E. *Homo floresiensis* (as above) vs. Indonesian *Homo erectus* (average mass 51kg, Indonesian average head-body length 800mm, average head-body length 800mm, female skull length 187mm, average skull length 195mm). [Sources Refs 1, 4, 5]

S. *Homo floresiensis* (as above) vs. *Homo sapiens* (Indonesian female mass 51kg, Indonesian female head-body length 800mm, Global average head-body length 834mm, global average skull length 180.1mm) [Sources: Refs 1, 3, 6-8]

Data sources for these measurements are: (1) Brown et al. 2004. Nature 431, 1055-1061; (2) Henry, M. M. 1991. Am. J. Physical Anthropol. 85, 149-158; 3. McHenry, H. M. & Coffing, K. 2000. Ann. Rev. Anthropol. 29, 125-146; (4) Anton, S. C. 2003 Yearbook of Physical Anthropology 46, 126-170; (5) Delson, E. et al. 2001. Anatomical Record 262, 380-397; (6)

Winkvist, A., Stenlund, H., Hakimi, M., Nurdiati, D. S. & Dibley, M. J. 2002. Am J Clin Nutr 75, 1072-1077; (7) Ruff, C. B., Trinkaus, E. & Holliday, T. W. 1997. Nature 387, 173; (8) McHenry, M. H. 1992 Am. J. Physical Anthropol. 87, 407-431.

1.4 Relative skull and body length

Because one of the major controversies surrounding the interpretation of *H. floresisensis* is the relatively small skull size compared to the stature estimated from limb bones (Falk et al., 2005; Jacob et al., 2006; Martin et al., 2006), we have tested whether the relationship between skull size and body length undergoes a shift in island primate taxa. We could not use the commonly employed encephalization quotient (ratio of brain weight to body weight) as we did not have skull volumes or estimated brain weights for most of the primate species in our data set. Instead, we calculated the ratio of skull length to head-body length (sitting height for hominids, see above), to make the parameters comparable across all species. Data were available for 17 comparisons (see Supplementary Table 2). We have used average skull and body length where available, but female and male specific measurements where the average was unavailable. We used RMA regression to find the slope of the relationship between mainland and island skull length to head-body length ratios, and to test whether this slope differed significantly from one (using the set of all comparisons, and repeated on a reduced set with only average measures included to avoid combining separate male and female measures in the same analysis). As an additional test, we used a pairwise t-test to test for a significant difference in the mean skull length to head-body length ratios between island and mainland taxa: see Supplementary Table 4 for details of statistical tests. Note that the hominid data points are for illustration only. They were not included in the statistical analysis as this would introduce a circularity: we wish to assess whether the size of *H. floresiensis* is consistent with the pattern of island dwarfing seen in primates generally, so it would be inappropriate to use data from *H. floresiensis* to generate the relationship against which it will be tested.

2. Supplementary Tables

Supplementary Table 1: Comparisons between island endemic primates and their closest mainland relatives. Rather than using a single taxonomic treatment, we accepted any island endemic described as being a distinct taxon (that is, consistently and recognizably different from the mainland populations: see Supplementary Methods for details). Where possible, we have used names from C. P. Groves "Primate Taxonomy" (Smithsonian Institution Press, Washington, 2001). For subspecies not listed in Groves, we used the taxonomy as given in the primary reference (see Ref column). Range for the mainland species may not report all countries in which the species is found: the aim is to give a general indication of the breadth of the range. Comparisons were chosen from published phylogenies where available (see Ref column). References are: (1) Smith RJ & Jungers WL 1997 J. Hum. Evol. 32:523; (2) Li Q-Q & Zhang Y-P 2005 Biochem. Genet. 43:375; (3) Purvis A 1995 Phil Trans Roy Soc Lond 348:405; (4) Flannery SP 2006 Primate factsheets http://members.tripod.com/cacajao/factsheets.html; (5) Groves CP 2001 Primate Taxonomy (Smithsonian Institution Press). 6. ARKive 2006 www.arkive.org; (7) Fooden J & Aimi M 2005 Fieldiana, Zool. 104:1; (8) Grubb P et al. 2003 Int. J. Primatol 24:1301; (9) Brandon-Jones D et al. 2004 Int. J. Primatol. 25:97; (10) Delson E et al. 2000 Anthropol Papers Am Museum Nat Hist 83:1 (data derived from database of primate body masses published online 2004); (11) Meijaard E & Groves CP 2004 Primate Report 68:71; (12) Niemitz, C. 1984 Biology of Tarsiers (Gustav Fischer Verlag). (13) Ambrose L 2003 Primates 44:25; (14) Takacs Z et al. 2005 Mol Phylogene. Evol. 36:456; (15) Muller S, Hollatz M & Wienberg J 2003 Hum. Genet. 113:493; (16) Hill WCO 1953. Primates: comparative anatomy and taxonomy: I - Strepsirhini (Edinburgh University Press).

Family	Island species	Range	Island area (km²)	Avg. mass (kg)	Male (kg)	Female (kg)	Mainland species	Range	Avg. mass (kg)	Male (kg)	Female (kg)	Ref
Cercopithecidae	*Macaca cyclopis*	Taiwan	35801	5.47	6.00	4.94	*Macaca mulatta*	India, China, SE Asia	8.23	9.36	7.09	1-5
	Macaca pagensis	Mentawai	3986	6.28	7.35	5.20	*Macaca nemestrina*	Indonesia, Malaysia, Thailand	9.74	12.54	6.93	2,5,6
	Macaca sinica	Sri Lanka	65610	4.44	5.68	3.20	*Macaca radiata*	India	5.26	6.67	3.85	1-3
	Macaca fuscata yakui	Yakushima	540	7.40	9.50	5.30	*Macaca fuscata*	Kyushu (Japan)	9.30	10.80	7.80	7
	Simias concolor	Mentawai	3986	7.98	9.15	6.81	*Nasalis larvatus*	Borneo	15.11	20.40	9.82	1,3
	Piliocolobus kirkii	Zanzibar	1660	5.63	5.80	5.46	*Piliocolobus gordonorum*	Tanzania	9.35	10.8	7.8	1,8, 14
	Presbytis melalophos rhionis	Bintang	1866			5.47	*Presbytis melalophos siamensis*	Malaysia, Thailand	6.79	6.69	6.88	4,9,10
	Presbytis natunae	Natuna	1714	4.92	4.54	5.29	*Presbytis femoralis*	Indonesia, Malaysia, Thailand	6.23	6.26	6.19	1,10,11
	Presbytis potenziani	Mentawai	3986	6.29	6.17	6.40	*Presbytis comata*	Java	6.70	6.68	6.71	1,9,11
	Trachypithecus cristatus vigilans	Natuna	1714		8.87		*Trachypithecus cristatus cristatus*	Borneo	6.19	6.61	5.76	1,4
	Trachypithecus vetulus	Sri Lanka	65610	7.04	8.17	5.90	*Trachypithecus johni*	India	11.60	12.00	11.20	1,9
Galagidae	*Galago alleni "Ia"*	Bioko	2017	0.43			*Galago alleni "Ib"*	Cameroon	0.29			13
Hylobatidae	*Hylobates klossii*	Mentawai	3986	5.80	5.67	5.92	*Hylobates moloch*	Java	6.42	6.58	6.25	1,14,15
Tarsiidae	*Tarsius pelengensis*	Peleng	394	0.17			*Tarsius syrichta*	Phillipines	0.14	0.16	0.11	1,12

Table ESM-2: Comparisons between island endemic primates and their closest mainland relatives for "body" (head and body length) and "skull" (maximum skull length except where indicated. Bizygomatic distance (marked with superscript b) used for both species in a comparison if maximum skull length not available, but for the sign tests and Wilcoxon rank tests only, not in any other analyses. For this dataset, comparisons were chosen primarily from geographic and taxonomic information rather than phylogenies: see Supplementary Methods for details. Range for the mainland species may not report all countries in which the species is found: the aim is to give a general indication of the breadth of the range. Pulau Lembeh and Ko Kram Yai were not identifiable from the ArcGIS data, so we estimated their area from maps. References are: (1) Hill WCO 1962 Primates: comparative anatomy and taxonomy: V - Cebidae Part b. (Edinburgh University Press); (2) Hill WCO 1960. Primates: comparative anatomy and taxonomy: IV - Cebidae Part A (Edinburgh University Press); (3) Groves CP 2001. Primate Taxonomy (Smithsonian Institution Press); (4) Hill WCO 1966. Primates: comparative anatomy and taxonomy: VI -Catarrhini Cercopithecoidea Cercopithecinae (Edinburgh University Press); (5) Fooden J & Wu H-Y 2001 Fieldiana, Zoology 98:70; (6) Hill WCO 1974. Primates: comparative anatomy and taxonomy: VII - Cynopithecinae (Edinburgh University Press); (7) Fooden J 1995 Fieldiana, Zoology 30:1; (8) Fooden J & Aimi M 2005 Fieldiana, Zoology 104:1; (9) Fooden J 1969. Taxonomy and Evolution of the Monkeys of Celebes (Primates: Cercopithecidae) (S. Karger); (10) Kitchener AC & Groves CP 2002 Mammalia 66: 533; (11) Fooden J 1988 Fieldiana, Zoology 45:1; (12) Fooden J 2000 Fieldiana, Zoology 966:180; (13) Rankin L, Lundrigan B 2006 *Nasalis concolor* (On-line), Animal Diversity Web. Accessed February 22, 2007; (14) ARKive 2006. www.arkive.org; (15) Flannery SP 2006 Primate factsheets. http://members.tripod.com/cacajao/; (16) Ambrose L 2003 Primates 44: 25; (17) Hill WCO 1953. Primates: comparative anatomy and taxonomy: I - Strepsirhini (Edinburgh University Press). (18) Ma S, Wang Y & Poirier F 1988 Primates 29: 277; (19) Hill WCO 1955. Primates: comparative anatomy and taxonomy: II - Haplorhini: Tarsioidea (Edinburgh University Press); (20) Woltanski A 2004 *Nasalis larvatus* (On-line), Animal Diversity Web. Accessed February 22, 2007

Island species	Range	Island size (km²)	Avg. skull (mm)	Male skull (mm)	Female skull (mm)	Avg. body (mm)	Male body (mm)	Female body (mm)	Mainland species	Range	Avg. skull (mm)	Male skull (mm)	Female skull (mm)	Avg. body (mm)	Male body (mm)	Female body (mm)	Ref
Alouatta belzebul mexianae	Mexiana	973	73[b]	78.5[b]	67.5[b]				*Alouatta belzebul belzebul*	Brazil	76[b]	86[b]	66[b]	577.5	590	565	1
Alouatta coibensis	Coiba	486	100	104.4	95.6			560	*Alouatta palliata*	Central America	109.5	114.4	104.5	503.6	539.6	467.5	1
Alouatta seniculus insulanus	Trinidad	4769	105.3			490		460	*Alouatta macconnelii*	Guiana, Brazil	120.3	133	107.7	574.5	639	510	1
Cebus capucinus curtus	Gorgona	23	58.4[b]			328	333	323	*Cebus capucinus imitator*	Panama	91	71.8[b]		387.4	381.5	393.3	2
Cercopithecus preussi insularis	Bioko	2017			94[c]			262[c]	*Cercopithecus preussi preussi*	Cameroon	97.9	102.6	93.2	477.5		450[c]	3,4
Cercopithecus erythrotis erythrotis	Bioko	2017	91.8	94[c]	89.5[c]	390.5	452[c]	329[c]	*Cercopithecus erythrotis camerunensis*	Cameroon	96.9	100.6	93.2	472.3	543	401.5	4
Chlorocebus pygerythrus excubitor	Pate	207		97.2[c]					*Chlorocebus pygerythrus arenarius*	Kenya	95.5	99.5	91.5		445[c]		4
Chlorocebus pygerythrus nesiotes	Pemba	584		100.7[c]					*Chlorocebus pygerythrus johnstoni*	Kenya	97.1	104.3	89.8	457.6	486.3	428.8	4
Macaca cyclopis	Taiwan	35801	117.8	125.2	110.4	545	650	440	*Macaca mulatta*	India, China	114.8	121.8	107.8	500.3	531.8	468.8	5
Macaca fascicularis atriceps	Khram Yai	100[a]	110.7	116.8	104.5	435.7	448.8	422.5	*Macaca fascicularis valida*	Thailand, Cambodia		122[c]			665.3[c]		6
Macaca fascicularis baweana	Bawean	192		126.1[c]			472[c]		*Macaca fascicularis mordax*	Indonesia		122.3		531.9	565.3	498.5	6
Macaca fascicularis fusca	Simeulue	1796		120		450.7	478	423.3	*Macaca fascicularis fascicularis*	Malaysia, Indonesia				406.2	408.6	403.8	6
Macaca fascicularis umbrosa	Nicobar	1045		129.5			502[c]		*Macaca fascicularis aurea*	Bangladesh, Thailand	120.5	128	113		560		3,7
Macaca fuscata yakui	Yakushima	540	121.2	128.9	113.4	353.3	367.8	338.7	*Macaca fuscata fuscata*	Kyushu	131.9	142.5	121.3	378.1	392.4	363.7	8
Macaca nigra lembicus	Lembeh	60[a]		124.2[c]			520[c]		*Macaca nigra nigra*	Sulawesi	130	139	120.9	522.1	531.7	512.5	2
Macaca ochreata brunescens	Buton	4484	131.2	145.1	117.2	452	485	419	*Macaca ochreata ochreata*	Sulawesi	127.5	137.4	117.6		509		9
Macaca pagensis	Mentawai	3986	122.4	134.2	110.6	487.7	530	445.4	*Macaca nemestrina*	Indonesia	141.2	155.7	126.6	563.6	626.6	500.6	10
Macaca sinica	Sri Lanka	65610	105.1	113	97.1	440.5	468	413	*Macaca radiata*	India	112.2	120	104.4	441	427	455	11,12
Mandrillus leucophaeus poensis	Bioko	2017	196.2						*Mandrillus leucophaeus leucophaeus*	Cameroon, Gabon	210.6						3
Simias concolor	Mentawai	3986				509			*Nasalis larvatus*	Borneo				650	700	600	13,20
Piliocolobus kirkii	Zanzibar	1660				540.8			*Piliocolobus gordonorum*	Tanzania				553.7	567.5	539.8	14
Trachypithecus vetulus	Sri Lanka	65610				543			*Trachypithecus johnii*	India				682	584	780	15
Galago alleni "Ia"	Bioko	2017				235			*Galago alleni "Ib"*	Cameroon				225			16
Galago demidoff poensis	Bioko	2017	38			120.7			*Galagoides demidoff demidovii*	Guinea	35			129			3,17
Galago zanzibaricus zanzibaricus	Zanzibar	1660	41.9			144.9			*Galago zanzibaricus cocos*	Tanzania, Kenya	41.7			154.3			3
Otolemur garnettii garnettii	Zanzibar	1660	65			266			*Otolemur garnettii panganiensis*	Kenya, Tanzania	64.3			268.4			3
Nomascus hainanus	Hainan	33920	103.5						*Hylobates concolor*	Vietnam, Laos	111						3,18
Loris lydekkerianus nordicus	Sri Lanka	65610	53.8			220.9			*Loris lydekkerianus lydekkerianus*	India	55			244.5			17
Nycticebus coucang bancanus	Banka	11910	56.2						*Nycticebus coucang coucang*	Sumatra	63.5						17
Nycticebus coucang natunae	Natuna	1714	58.9						*Nycticebus coucang borneanus*	Borneo	55.1						17
Tarsius bacanus natunae	Natuna	1714				140			*Tarsius bacanus borneanus*	Borneo				138	142	133.9	19
Tarsius bacanus saltator	Belitung	4833						133	*Tarsius bacanus bancanus*	Sumatra				138.7			19
Tarsius pelengensis	Peleng	394				136			*Tarsius tarsier*	Suluwesi				128.5	137.5	133[c]	19

a = approximate island area estimated from printed map area; b = bizygomatic length; c = type specimen; d = maximum

Supplementary Table 3: Results of sign tests and Wilcoxon signed-ranks tests for the island rule in primates, for (a) adult mass, (b) adult head-body length, and (c) adult skull size, both for the set of all comparisons, and for a reduced set excluding comparisons between small-bodied taxa (less than 5kg in mass, or 200mm in head-and-body length, or 50mm skull size)

(a) Mass

	all comparisons	above 5kg	male	female
comparisons	12	10	11	11
positive comparisons	10	10	10	11
p (sign test)	0.014	0.003	0.006	0.002
z	2.197	2.803	2.49	2.93
p (Wilcoxon signed-ranks test)	0.019	0.001	0.006	0.0004

(a) Head-body length

	all comparisons	above 200mm	male	female
comparisons	18	14	12	8
positive comparisons	13	11	8	7
p (sign test)	0.048	0.029	0.194	0.035
z	2.156	2.166	0.941	2.38
p (Wilcoxon signed-ranks test)	0.016	0.015	0.173	0.009

(a) Skull size

	all comparisons	above 50mm	male	female
comparisons	18	16	14	9
positive comparisons	12	12	10	6
p (sign test)	0.048	0.038	0.09	0.25
z	2.286	2.689	2.35	1.6
p (Wilcoxon signed-ranks test)	0.011	0.004	0.009	0.055

Supplementary Table 4: Results of linear regressions between S_i (the ratio of island primate body size to mainland primate body size) and mainland body size, island area and degree of sexual size dimorphism, for (a) adult mass, (b) adult head-body length. For regression against mainland body size, we used Reduced Major Axis (RMA) regression. For regression against island area and sexual dimorphism we used Ordinary Least Squares (OLS) regression. Note that these results are presented for comparison with previous studies: this type of analysis is considered problematic due to the regression of a ratio against its denominator. See Supplementary Figure 2 for a graphical representation of these data.

t_{obs} = observed t-value from the regression; t_{random} = t-value from a null model with randomly generated island body size values.

(a) S_i (mass)

Predictor	d.f.	slope	t_{obs}	$p\ (t_{obs} = 0)$	$p(t_{obs} = t_{random})$
mainland mass	10	-0.07	-8.13	<0.0001	<0.0001
ln(island area)	10	0.06	-1.31	0.22	
sexual dimorphism	9	0.278	0.806	0.441	

(b) S_i (head-body length)

Predictor	d.f.	slope	t_{obs}	$p\ (t_{obs} = 0)$	$p(t_{obs} = t_{random})$
mainland length	15	-0.17	-4.47	<0.0001	0.015
ln(island area)	15	-0.01	-0.82	0.426	
sexual dimorphism	10	-0.643	-2.909	0.016	

(c) S_i (skull length)

| predictor	d.f.	slope	t_{obs}	$p\ (t_{obs} = 0)$	$p(t_{obs} = t_{random})$
mainland skull length	14	-0.001	-4.35	0.001	0.016
ln(island area)	14	-0.002	-0.18	0.859	

3. Supplementary Figures

Supplementary Figure 1: Comparison of ratio of skull length to head-body length between island and mainland primates. Each point represents an independent comparison between an island endemic primate and its mainland relative: circles are average measures, squares are male only, and open triangles are female only (see Tables 1 & 2). The slope of the reduced major axis regression line (solid line) is not significantly different from a slope of 1 (dotted line: N = 17, slope = 1.19±0.27, $p_{slope=1}$=0.195). Black triangles represent comparisons between *Homo floresiensis* and three other hominids: *Homo sapiens* (S)*, Homo erectus* (E) and *Australopithecus* (A) – note that these points are for illustration only and were not used in the statistical analysis. See supplementary methods for details of data sources.
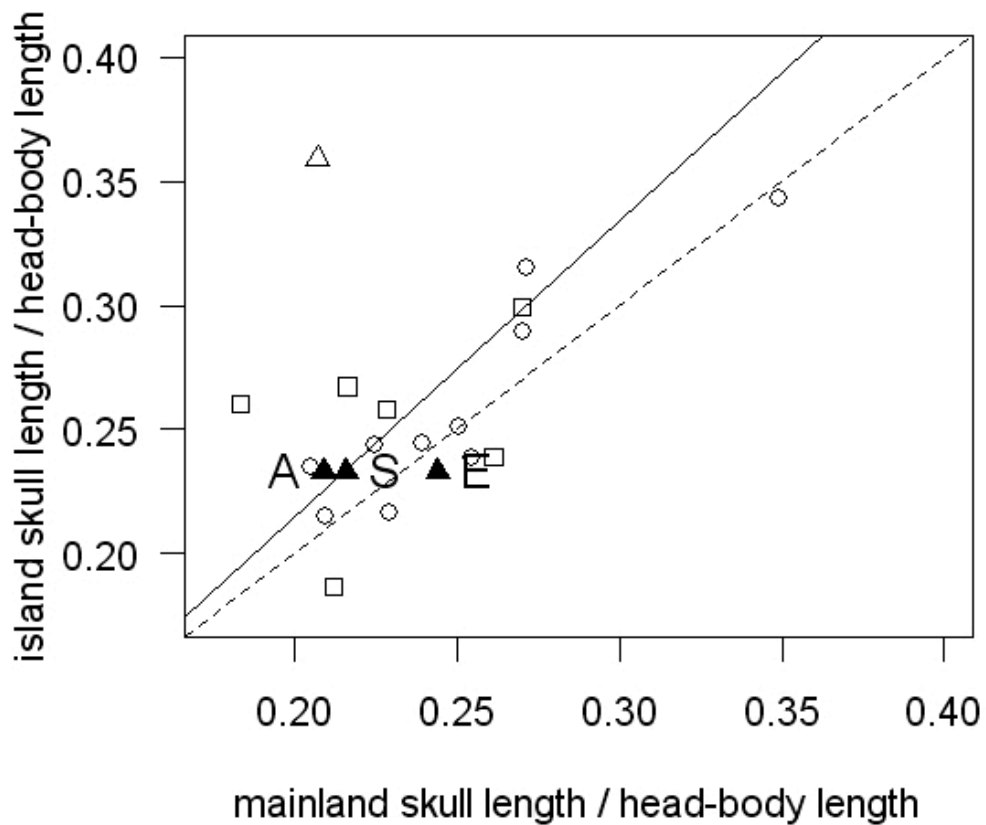
Supplementary Figure 2: Relationship between body size of mainland primate populations and S_i (ratio of island to mainland body size), for mass, head-body length, and skull length. Each open circle represents an independent comparison between an island endemic primate and its mainland relative: see Supplementary Tables 1 & 2 for data. The solid lines are reduced major axis regression lines: See Supplementary Table 4 for results of statistical analyses. Triangles represent comparisons between *Homo floresiensis* and three other hominids: *Homo sapiens* (S), *Homo erectus* (E) and *Australopithecus afarensis* (A): for sources of size data see Supplementary Methods. These three comparisons were chosen to represent a range of possible ancestral conditions for *H. floresiensis* for which we could gain appropriate comparative data, and are not intended to be an exhaustive list of possible relatives. Note that the hominid points were not used in the statistical analysis.
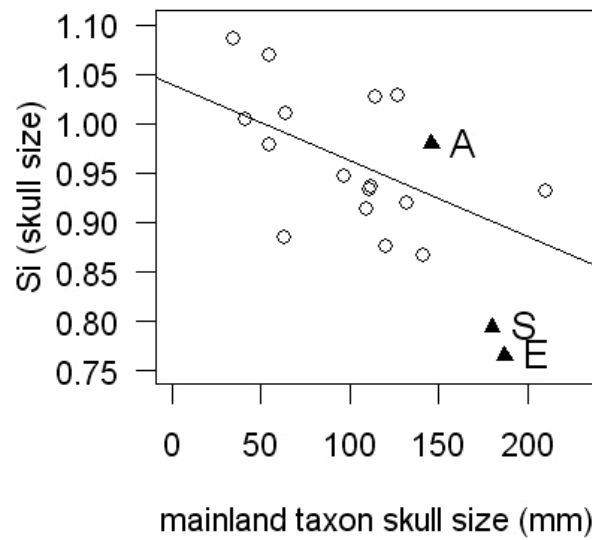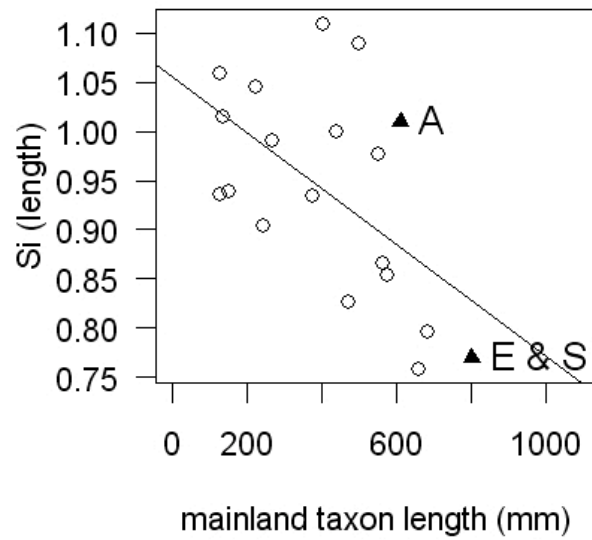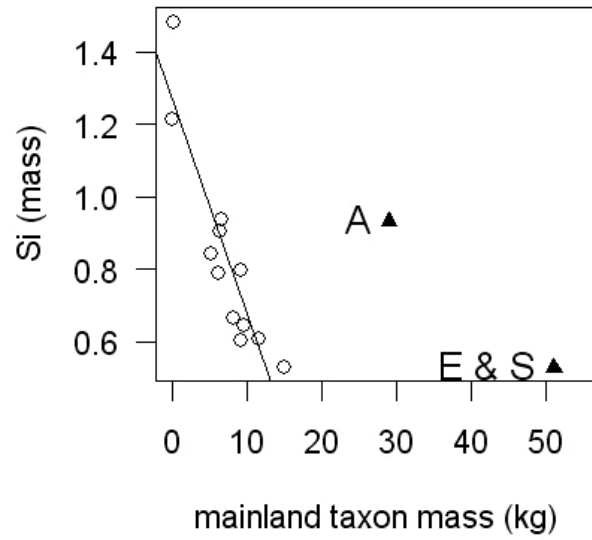
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