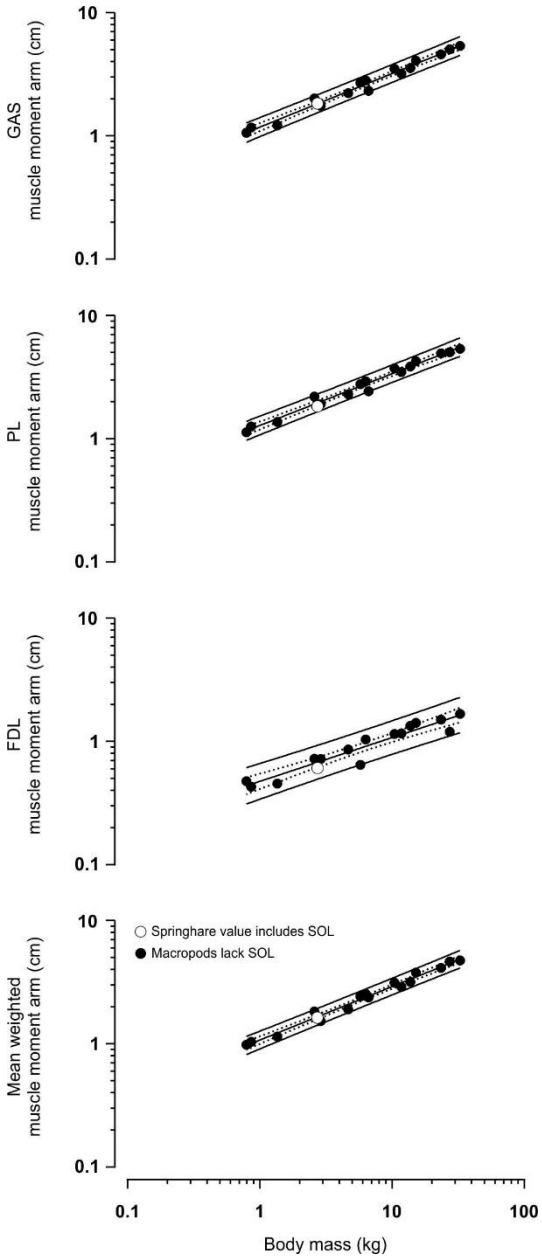

Figure S1. GAS, PL, FDL and mean weighted muscle moment arms acting at the ankle joint of the springhare (empty circles), superimposed onto scaling analyses of 16 species of bipedal hopping macropods (filled circles) plotted on logged axes. Fitted to each graph are the regression mean (solid inner line), 95% confidence band (dotted outer lines) and 95% prediction band (solid outer lines). Note that mean weighted muscle moment arm of the springhare includes the small contribution of the SOL, which is vestigial and virtually absent in the macropods. FDL muscle moment arm is unavailable in one macropod species (*Macropus eugenii*). GAS is gastrocnemius, PL is plantaris, FDL is flexor digitorum longus, and SOL is soleus. See Table S1 for species inventory and literature sources of the macropod data.

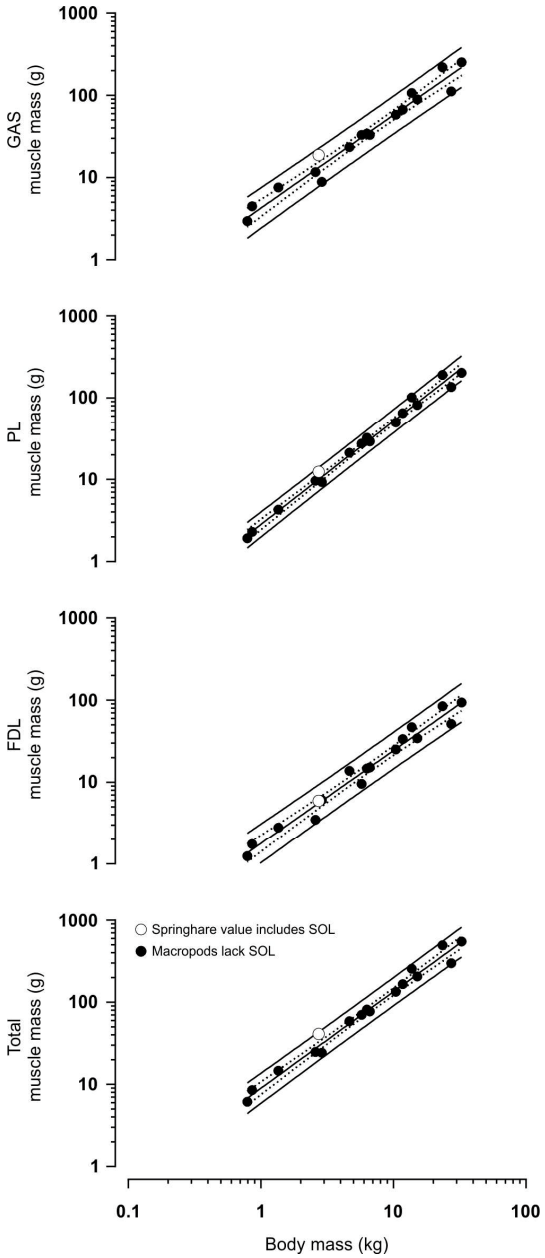

Figure S2. GAS, PL, FDL and total masses of the ankle extensor muscles in the springhare (empty circles), superimposed onto scaling analyses of 16 species of bipedal hopping macropods (filled circles) plotted on logged axes. Fitted to each graph are the regression mean (solid inner line), 95% confidence band (dotted outer lines) and 95% prediction band (solid outer lines). Note that total muscle mass in the springhare includes the small contribution of the SOL, which is vestigial and virtually absent in the macropods. See Figure S1 for muscle abbreviations and Table S1 for species and sources of the macropod data.

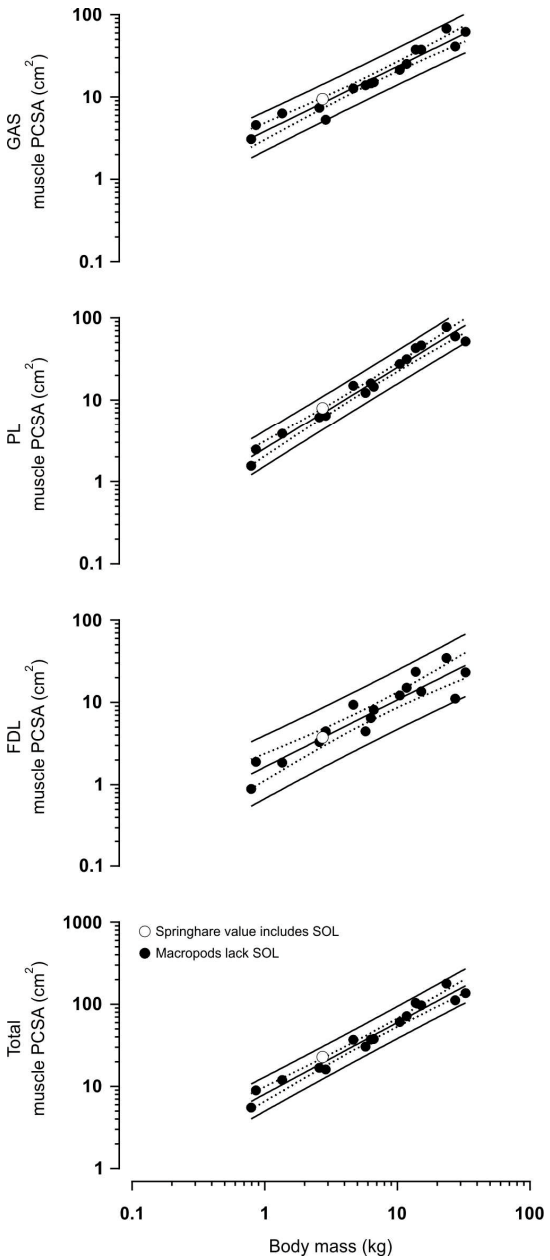

Figure S3. GAS, PL, FDL and total physiological cross-sectional areas of the ankle extensor muscles in the springhare (empty circles), superimposed onto scaling analyses of 16 species of bipedal hopping macropods (filled circles) plotted on logged axes. Fitted to each graph are the regression mean (solid inner line), 95% confidence band (dotted outer lines) and 95% prediction band (solid outer lines). Note that total muscle physiological cross-sectional area in the springhare includes the small contribution of the SOL, which is vestigial and virtually absent in the macropods. PCSA is muscle physiological cross-sectional area. See Figure S1 for muscle abbreviations and Table S1 for species and sources of the macropod data.

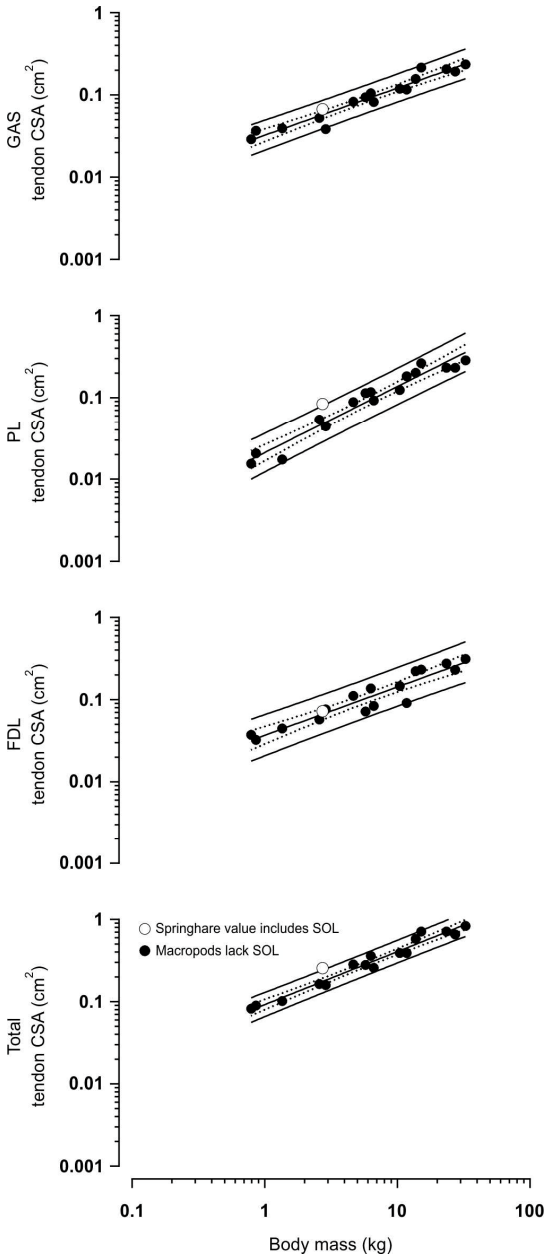

Figure S4. GAS, PL, FDL and total cross-sectional areas of the ankle extensor tendons in the springhare (empty circles), superimposed onto scaling analyses of 16 species of bipedal hopping macropods (filled circles) plotted on logged axes. Fitted to each graph are the regression mean (solid inner line), 95% confidence band (dotted outer lines) and 95% prediction band (solid outer lines). Note that total tendon cross-sectional area in the springhare includes the small contribution of the SOL, which is vestigial and virtually absent in the macropods. CSA is tendon cross-sectional area. See Figure S1 for muscle abbreviations and Table S1 for species and sources of the macropod data.

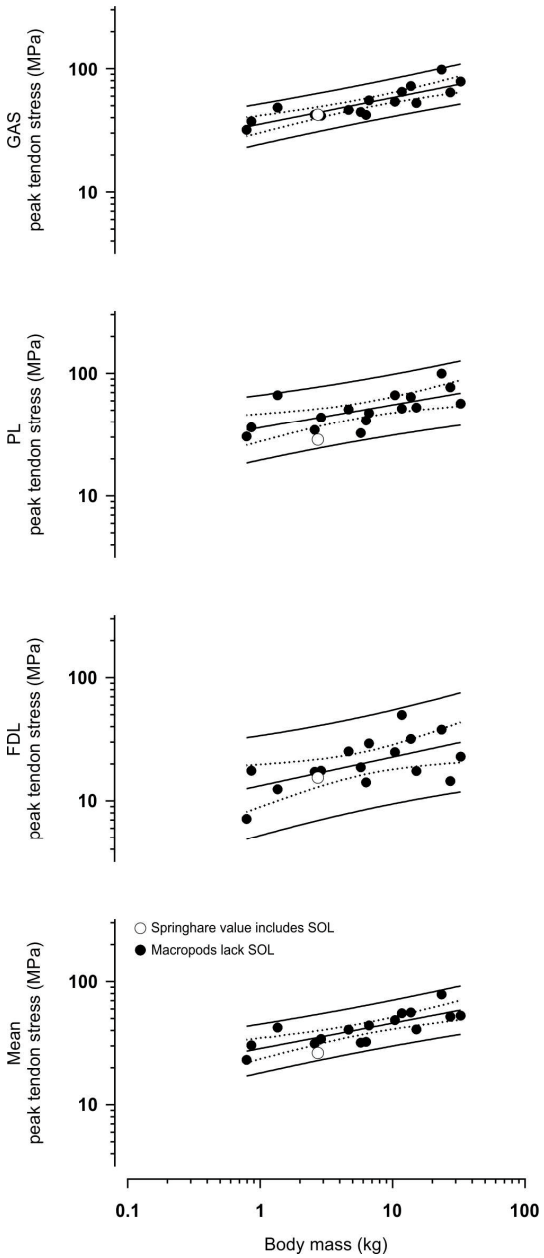

Figure S5. Estimated GAS, PL, FDL and mean peak stresses experienced by the ankle extensor tendons in the springhare (empty circles), superimposed onto scaling analyses of 16 species of bipedal hopping macropods (filled circles) plotted on logged axes. Fitted to each graph are the regression mean (solid inner line), 95% confidence band (dotted outer lines) and 95% prediction band (solid outer lines). Note that mean peak tendon stress in the springhare includes the contribution of the SOL, which is vestigial and virtually absent in the macropods. See Figure S1 for muscle abbreviations and Table S1 for species and sources of the macropod data.

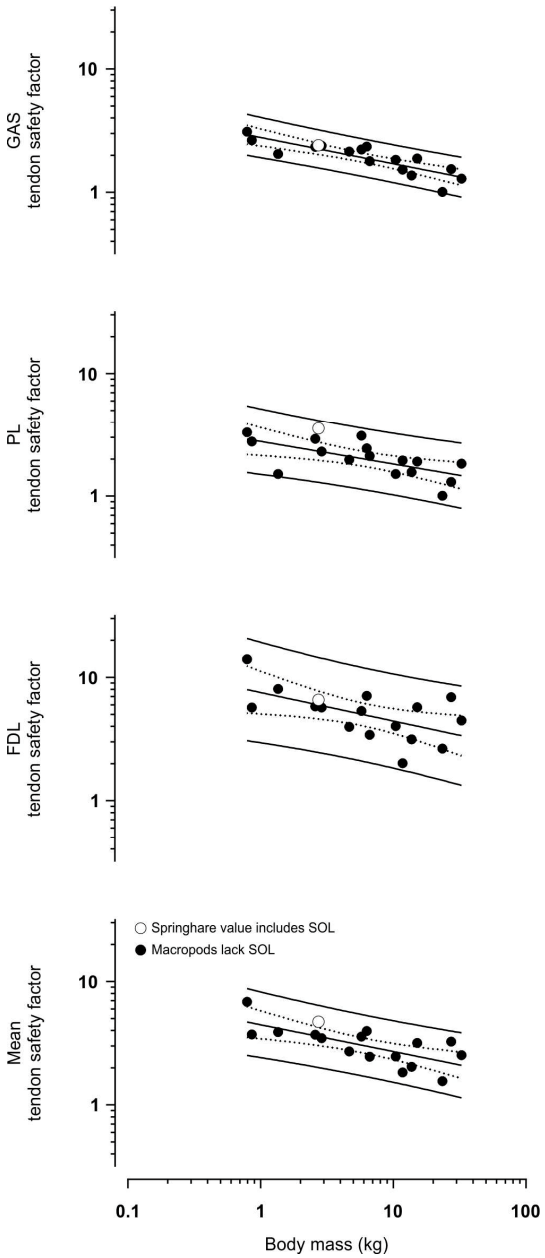

Figure S6. Estimated GAS, PL, FDL and mean safety factors of the ankle extensor tendons in the springhare (empty circles), superimposed onto scaling analyses of 16 species of bipedal hopping macropods (filled circles) plotted on logged axes. Fitted to each graph are the regression mean (solid inner line), 95% confidence band (dotted outer lines) and 95% prediction band (solid outer lines). Note that mean tendon safety factor in the springhare includes the contribution of the SOL, which is vestigial and virtually absent in the macropods. See Figure S1 for muscle abbreviations and Table S1 for species and sources of the macropod data.

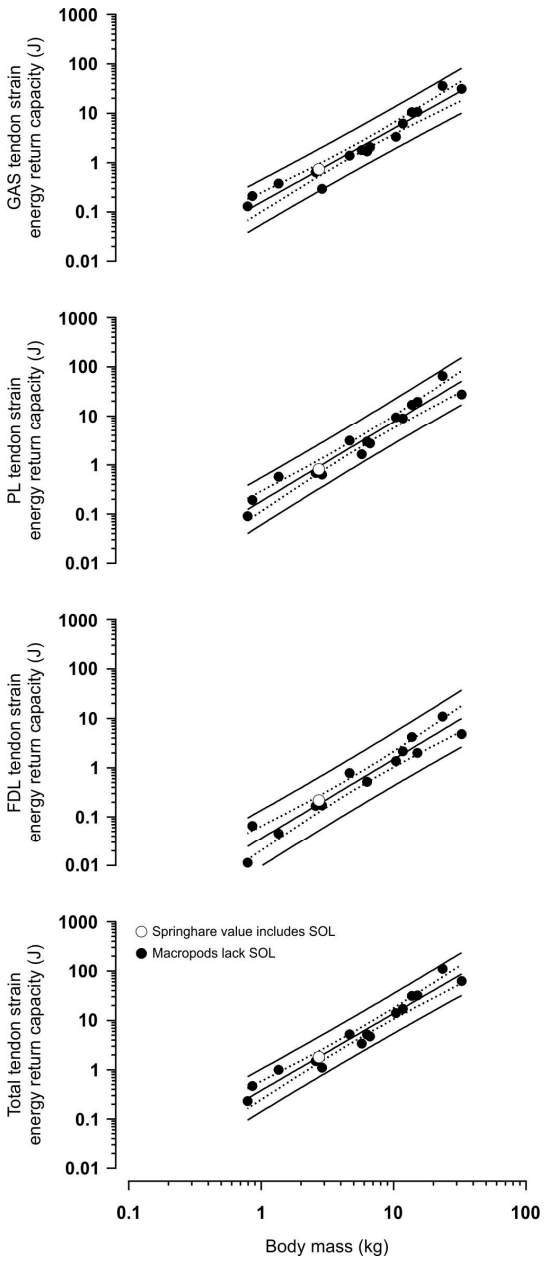

Figure S7. Estimated GAS, PL, FDL and total strain energy return capacities of the ankle extensor tendons in the springhare (empty circles), superimposed onto scaling analyses of 15 species of bipedal hopping macropods (filled circles) plotted on logged axes. Fitted to each graph are the regression mean (solid inner line), 95% confidence band (dotted outer lines) and 95% prediction band (solid outer lines). Note that total tendon strain energy return capacity in the springhare includes the small contribution of the SOL, which is vestigial and virtually absent in the macropods. FDL strain energy is unavailable in two macropod species (*Macropus eugenii* and *Petrogale xanthopus*) and strain energy is entirely unavailable in another (*M. rufus*). See Figure S1 for muscle abbreviations and Table S1 for species and sources of the macropod data.

Table S1. Inventory of species used in the scaling analyses of bipedal hopping macropods.

Common name	Species name	Body mass (kg)
Long-nosed potoroo	*Potorous tridactylus*	0.79 [a]
Brush-tailed bettong	*Bettongia penicillata*	0.86 [a]
Burrowing bettong	*Bettongia lesueur*	1.36 [a]
Pearson Island rock wallaby	*Petrogale lateralis pearsoni*	2.59 [a]
Quokka	*Setonix brachyurus*	2.89 [a]
Red-necked pademelon	*Thylogale thetis*	4.66 [a]
Yellow-footed rock wallaby	*Petrogale xanthopus*	5.78 [a]
Black-striped wallaby	*Macropus dorsalis*	6.31 [a]
Tammar wallaby	*Macropus eugenii*	6.64 [a]
Agile wallaby	*Macropus agilis*	10.46 [a]
Swamp wallaby	*Wallabia bicolor*	11.77 [a]
Red-necked wallaby	*Macropus rufogriseus*	13.76 [a]
Common wallaroo	*Macropus robustus*	15.15 [a]
Eastern grey kangaroo	*Macropus giganteus*	23.47 [a]
Red kangaroo	*Macropus rufus*	27.30 [a]
Western grey kangaroo	*Macropus fuliginosus*	32.68 [b,c]

[a] Data from (McGowan et al., 2008), [b] data from (Snelling et al., 2017), [c] values from three young-at-foot excluded because ankle extensor muscle-tendon units may not have reached structural and functional maturity.

References

McGowan CP, Skinner J, Biewener AA (2008) Hind limb scaling of kangaroos and wallabies (superfamily Macropodoidea): Implications for hopping performance, safety factor and elastic savings. *J Anat* **212,** 153-163.

Snelling EP, Biewener AA, Hu QH, et al. (2017) Scaling of the ankle extensor muscle-tendon units and the biomechanical implications for bipedal hopping locomotion in the post-pouch kangaroo *Macropus fuliginosus*. *J Anat* **231,** 921-930.