

Appendix 1. A review of the size and plumage characteristics between sexes of every woodpecker species in the world.

Table A1.1. All woodpecker species were assessed to determine if sexes are dimorphic, similar, monochromatic, or monomorphic. Monomorphic species ($n = 2$) exhibit no plumage or size dimorphism that allow males and females to be distinguished in the hand. Monochromatic species ($n = 4$) have identical plumage between sexes, but exhibit size dimorphism. Species noted to be “similar” in appearance between sexes ($n = 20$) have nearly imperceptible differences in plumage characteristics. Species are arranged by morphism and scientific name.

Common name	Scientific name	Morphism
Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>	Monomorphic ^{1,2}
Lewis's Woodpecker	<i>Melanerpes lewis</i>	Monomorphic ^{1,3}
Red-breasted Sapsucker	<i>Sphyrapicus ruber</i>	Monochromatic ⁴
Rufous-necked Wryneck	<i>Jynx ruficollis</i>	Monochromatic ⁵
Guadeloupe Woodpecker	<i>Melanerpes herminieri</i>	Monochromatic ⁶
Eurasian Wryneck	<i>Jynx torquilla</i>	Monochromatic ⁵
Campo Flicker	<i>Colaptes campestris</i>	Similar ⁵
Green-barred Woodpecker	<i>Colaptes melanochloros</i>	Similar ⁵
Chilean Flicker	<i>Colaptes pitius</i>	Similar ⁵
Andean Flicker	<i>Colaptes rupicola</i>	Similar ⁵
Gray-capped Woodpecker	<i>Dendrocopos canicapillus</i>	Similar ⁵
Pygmy Woodpecker	<i>Dendrocopos kizuki</i>	Similar ⁵
Middle Spotted Woodpecker	<i>Dendrocopos medius</i>	Similar ⁷
Sunda Woodpecker	<i>Dendrocopos moluccensis</i>	Similar ⁵
Brown-capped Woodpecker	<i>Dendrocopos nanus</i>	Similar ⁵
Golden-crowned Woodpecker	<i>Dendropicos xantholophus</i>	Similar ⁵
Ground Woodpecker	<i>Geocolaptes olivaceus</i>	Similar ⁵
Black-and-buff Woodpecker	<i>Meiglyptes jugularis</i>	Similar ⁵
White-fronted Woodpecker	<i>Melanerpes cactorum</i>	Similar ⁵
White Woodpecker	<i>Melanerpes candidus</i>	Similar ⁵
Beautiful Woodpecker	<i>Melanerpes pulcher</i>	Similar ⁵
Red-cockaded Woodpecker	<i>Picoides borealis</i>	Similar ³
Grayish Piculet	<i>Picumnus granadensis</i>	Similar ⁵
Ecuadorian Piculet	<i>Picumnus sclateri</i>	Similar ⁵
Checkered Woodpecker	<i>Veniliornis mixtus</i>	Similar ⁵
Red-naped Sapsucker	<i>Sphyrapicus nuchalis</i>	Similar ^{1,5}
Bay Woodpecker	<i>Blythipicus pyrrhotis</i>	Dimorphic ⁵
Maroon Woodpecker	<i>Blythipicus rubiginosus</i>	Dimorphic ⁵
Guayaquil Woodpecker	<i>Campephilus gayaquilensis</i>	Dimorphic ⁵

Pale-billed Woodpecker	<i>Campephilus guatemalensis</i>	Dimorphic ⁵
Crimson-bellied Woodpecker	<i>Campephilus haematogaster</i>	Dimorphic ⁵
Imperial Woodpecker†	<i>Campephilus imperialis</i>	Dimorphic ⁵
Cream-backed Woodpecker	<i>Campephilus leucopogon</i>	Dimorphic ⁵
Magellanic Woodpecker	<i>Campephilus magellanicus</i>	Dimorphic ⁵
Crimson-crested Woodpecker	<i>Campephilus melanoleucos</i>	Dimorphic ⁵
Powerful Woodpecker	<i>Campephilus pollens</i>	Dimorphic ⁵
Ivory-billed Woodpecker†	<i>Campephilus principalis</i>	Dimorphic ³
Robust Woodpecker	<i>Campephilus robustus</i>	Dimorphic ⁵
Red-necked Woodpecker	<i>Campephilus rubricollis</i>	Dimorphic ⁵
Golden-tailed Woodpecker	<i>Campethera abingoni</i>	Dimorphic ⁵
Bennett's Woodpecker	<i>Campethera bennettii</i>	Dimorphic ⁵
Green-backed Woodpecker	<i>Campethera cailliautii</i>	Dimorphic ⁵
Brown-eared Woodpecker	<i>Campethera caroli</i>	Dimorphic ⁵
Little Green Woodpecker	<i>Campethera maculosa</i>	Dimorphic ⁵
Mombasa Woodpecker	<i>Campethera mombassica</i>	Dimorphic ⁵
Buff-spotted Woodpecker	<i>Campethera nivosa</i>	Dimorphic ⁵
Knysna Woodpecker	<i>Campethera notata</i>	Dimorphic ⁵
Nubian Woodpecker	<i>Campethera nubica</i>	Dimorphic ⁵
Fine-spotted Woodpecker	<i>Campethera punctuligera</i>	Dimorphic ⁵
Reichenow's Woodpecker	<i>Campethera scriptoricauda</i>	Dimorphic ⁵
Tullberg's Woodpecker	<i>Campethera tullbergi</i>	Dimorphic ⁵
Chestnut-colored Woodpecker	<i>Celeus castaneus</i>	Dimorphic ¹
Chestnut Woodpecker	<i>Celeus elegans</i>	Dimorphic ¹
Blond-crested Woodpecker	<i>Celeus flavescens</i>	Dimorphic ¹
Cream-colored Woodpecker	<i>Celeus flavus</i>	Dimorphic ⁵
Helmeted Woodpecker	<i>Celeus galeatus</i>	Dimorphic ⁵
Scale-breasted Woodpecker	<i>Celeus grammicus</i>	Dimorphic ¹
Cinnamon Woodpecker	<i>Celeus loricatus</i>	Dimorphic ¹
Pale-crested Woodpecker	<i>Celeus lugubris</i>	Dimorphic ⁵
Kaempfer's Woodpecker	<i>Celeus obrieni</i>	Dimorphic ⁵
Rufous-headed Woodpecker	<i>Celeus spectabilis</i>	Dimorphic ⁵
Ringed Woodpecker	<i>Celeus torquatus</i>	Dimorphic ⁵
Waved Woodpecker	<i>Celeus undatus</i>	Dimorphic ¹
Red-headed Flameback	<i>Chrysocolaptes erythrocephalus</i>	Dimorphic ⁵
White-naped Woodpecker	<i>Chrysocolaptes festivus</i>	Dimorphic ⁵
Greater Flameback	<i>Chrysocolaptes guttacristatus</i>	Dimorphic ⁵
Luzon Flameback	<i>Chrysocolaptes haematribon</i>	Dimorphic ⁵

Buff-spotted Flameback	<i>Chrysocolaptes lucidus</i>	Dimorphic ⁵
Crimson-backed Flameback	<i>Chrysocolaptes stricklandi</i>	Dimorphic ⁵
Javan Flameback	<i>Chrysocolaptes strictus</i>	Dimorphic ⁵
Yellow-faced Flameback	<i>Chrysocolaptes xanthocephalus</i>	Dimorphic ⁵
Greater Yellownape	<i>Chrysophlegma flavinucha</i>	Dimorphic ⁵
Chequer-throated Woodpecker	<i>Chrysophlegma mentale</i>	Dimorphic ⁵
Banded Woodpecker	<i>Chrysophlegma miniaceum</i>	Dimorphic ⁵
Bronze-winged Woodpecker	<i>Colaptes aeruginosus</i>	Dimorphic ⁵
Black-necked Woodpecker	<i>Colaptes atricollis</i>	Dimorphic ⁵
Northern Flicker	<i>Colaptes auratus</i>	Dimorphic ³
Gray-crowned Woodpecker	<i>Colaptes auricularis</i>	Dimorphic ⁵
Gilded Flicker	<i>Colaptes chrysoides</i>	Dimorphic ⁵
Fernandina's Flicker	<i>Colaptes fernandinae</i>	Dimorphic ⁵
Spot-breasted Woodpecker	<i>Colaptes punctigula</i>	Dimorphic ⁵
Crimson-mantled Woodpecker	<i>Colaptes rivolii</i>	Dimorphic ⁵
Golden-olive Woodpecker	<i>Colaptes rubiginosus</i>	Dimorphic ⁵
Freckle-breasted Woodpecker	<i>Dendrocopos analis</i>	Dimorphic ⁵
Sind Woodpecker	<i>Dendrocopos assimilis</i>	Dimorphic ⁵
Stripe-breasted Woodpecker	<i>Dendrocopos atratus</i>	Dimorphic ⁵
Brown-fronted Woodpecker	<i>Dendrocopos auriceps</i>	Dimorphic ⁵
Crimson-breasted Woodpecker	<i>Dendrocopos cathpharius</i>	Dimorphic ⁵
Darjeeling Woodpecker	<i>Dendrocopos darjellensis</i>	Dimorphic ⁵
Arabian Woodpecker	<i>Dendrocopos dorae</i>	Dimorphic ⁵
Himalayan Woodpecker	<i>Dendrocopos himalayensis</i>	Dimorphic ⁵
Rufous-bellied Woodpecker	<i>Dendrocopos hyperythrus</i>	Dimorphic ⁵
White-winged Woodpecker	<i>Dendrocopos leucopterus</i>	Dimorphic ⁵
White-backed Woodpecker	<i>Dendrocopos leucotos</i>	Dimorphic ⁵
Fulvous-breasted Woodpecker	<i>Dendrocopos macei</i>	Dimorphic ⁵
Philippine Woodpecker	<i>Dendrocopos maculatus</i>	Dimorphic ⁵
Yellow-crowned Woodpecker	<i>Dendrocopos mahrattensis</i>	Dimorphic ⁵
Great Spotted Woodpecker	<i>Dendrocopos major</i>	Dimorphic ⁵
Lesser Spotted Woodpecker	<i>Dendrocopos minor</i>	Dimorphic ⁵
Sulu Woodpecker	<i>Dendrocopos ramsayi</i>	Dimorphic ⁵
Syrian Woodpecker	<i>Dendrocopos syriacus</i>	Dimorphic ⁵
Sulawesi Woodpecker	<i>Dendrocopos temminckii</i>	Dimorphic ⁵
Abyssinian Woodpecker	<i>Dendropicos abyssinicus</i>	Dimorphic ⁵
Little Gray Woodpecker	<i>Dendropicos elachus</i>	Dimorphic ⁵
Elliot's Woodpecker	<i>Dendropicos elliotii</i>	Dimorphic ⁵

Cardinal Woodpecker	<i>Dendropicos fuscescens</i>	Dimorphic ⁵
Gabon Woodpecker	<i>Dendropicos gabonensis</i>	Dimorphic ⁵
African Gray Woodpecker	<i>Dendropicos goertae</i>	Dimorphic ⁵
Olive Woodpecker	<i>Dendropicos griseocephalus</i>	Dimorphic ⁵
Melancholy Woodpecker	<i>Dendropicos lugubris</i>	Dimorphic ⁸
Bearded Woodpecker	<i>Dendropicos namaquus</i>	Dimorphic ⁵
Brown-backed Woodpecker	<i>Dendropicos obsoletus</i>	Dimorphic ⁵
Speckle-breasted Woodpecker	<i>Dendropicos poecilolaemus</i>	Dimorphic ⁵
Fire-bellied Woodpecker	<i>Dendropicos pyrrhogaster</i>	Dimorphic ⁵
Mountain Gray Woodpecker	<i>Dendropicos spodocephalus</i>	Dimorphic ⁵
Stierling's Woodpecker	<i>Dendropicos stierlingi</i>	Dimorphic ⁵
Black-rumped Flameback	<i>Dinopium benghalense</i>	Dimorphic ⁵
Spot-throated Flameback	<i>Dinopium everetti</i>	Dimorphic ⁵
Common Flameback	<i>Dinopium javanense</i>	Dimorphic ⁵
Olive-backed Woodpecker	<i>Dinopium rafflesii</i>	Dimorphic ⁵
Himalayan Flameback	<i>Dinopium shorii</i>	Dimorphic ⁵
Andaman Woodpecker	<i>Dryocopus hodgei</i>	Dimorphic ⁵
White-bellied Woodpecker	<i>Dryocopus javensis</i>	Dimorphic ⁵
Lineated Woodpecker	<i>Dryocopus lineatus</i>	Dimorphic ⁵
Black Woodpecker	<i>Dryocopus martius</i>	Dimorphic ⁵
Pileated Woodpecker	<i>Dryocopus pileatus</i>	Dimorphic ⁵
Black-bodied Woodpecker	<i>Dryocopus schulzi</i>	Dimorphic ⁵
Pale-headed Woodpecker	<i>Gecinulus grantia</i>	Dimorphic ⁵
Bamboo Woodpecker	<i>Gecinulus viridis</i>	Dimorphic ⁹
Heart-spotted Woodpecker	<i>Hemicircus canente</i>	Dimorphic ⁵
Grey-and-buff Woodpecker	<i>Hemicircus concretus</i>	Dimorphic ⁵
Buff-rumped Woodpecker	<i>Meiglyptes tristis</i>	Dimorphic ⁵
Buff-necked Woodpecker	<i>Meiglyptes tukki</i>	Dimorphic ⁵
Golden-fronted Woodpecker	<i>Melanerpes aurifrons</i>	Dimorphic ³
Red-bellied Woodpecker	<i>Melanerpes carolinus</i>	Dimorphic ³
Golden-naped Woodpecker	<i>Melanerpes chrysauchen</i>	Dimorphic ⁵
Golden-cheeked Woodpecker	<i>Melanerpes chrysogenys</i>	Dimorphic ⁵
Yellow-tufted Woodpecker	<i>Melanerpes cruentatus</i>	Dimorphic ⁵
Yellow-fronted Woodpecker	<i>Melanerpes flavifrons</i>	Dimorphic ⁵
Acorn Woodpecker	<i>Melanerpes formicivorus</i>	Dimorphic ³
Hoffmann's Woodpecker	<i>Melanerpes hoffmannii</i>	Dimorphic ⁵
Gray-breasted Woodpecker	<i>Melanerpes hypopolius</i>	Dimorphic ⁵
Puerto Rican Woodpecker	<i>Melanerpes portoricensis</i>	Dimorphic ⁵

Black-cheeked Woodpecker	<i>Melanerpes pucherani</i>	Dimorphic ⁵
Yucatan Woodpecker	<i>Melanerpes pygmaeus</i>	Dimorphic ⁵
Jamaican Woodpecker	<i>Melanerpes radiolatus</i>	Dimorphic ⁵
Red-crowned Woodpecker	<i>Melanerpes rubricapillus</i>	Dimorphic ⁵
Velasquez's Woodpecker	<i>Melanerpes santacruzi</i>	Dimorphic ⁵
Hispaniolan Woodpecker	<i>Melanerpes striatus</i>	Dimorphic ⁶
West Indian Woodpecker	<i>Melanerpes superciliaris</i>	Dimorphic ⁵
Gila Woodpecker	<i>Melanerpes uropygialis</i>	Dimorphic ⁵
Rufous Woodpecker	<i>Micropternus brachyurus</i>	Dimorphic ⁵
Southern Sooty-Woodpecker	<i>Mulleripicus fuliginosus</i>	Dimorphic ⁵
Ashy Woodpecker	<i>Mulleripicus fulvus</i>	Dimorphic ⁵
Northern Sooty-Woodpecker	<i>Mulleripicus funebris</i>	Dimorphic ⁵
Great Slaty Woodpecker	<i>Mulleripicus pulverulentus</i>	Dimorphic ⁵
Antillean Piculet	<i>Nesocittes micromegas</i>	Dimorphic ⁵
White-headed Woodpecker	<i>Picoides albolarvatus</i>	Dimorphic ⁵
Black-backed Woodpecker	<i>Picoides arcticus</i>	Dimorphic ⁵
Arizona Woodpecker	<i>Picoides arizonae</i>	Dimorphic ⁵
American Three-toed Woodpecker	<i>Picoides dorsalis</i>	Dimorphic ³
Smoky-brown Woodpecker	<i>Picoides fumigatus</i>	Dimorphic ⁵
Nuttall's Woodpecker	<i>Picoides nuttallii</i>	Dimorphic ⁵
Downy Woodpecker	<i>Picoides pubescens</i>	Dimorphic ³
Ladder-backed Woodpecker	<i>Picoides scalaris</i>	Dimorphic ⁵
Strickland's Woodpecker	<i>Picoides stricklandi</i>	Dimorphic ⁵
Eurasian Three-toed Woodpecker	<i>Picoides tridactylus</i>	Dimorphic ⁵
Hairy Woodpecker	<i>Picoides villosus</i>	Dimorphic ³
White-browed Woodpecker	<i>Piculus aurulentus</i>	Dimorphic ⁵
Stripe-cheeked Woodpecker	<i>Piculus collopterus</i>	Dimorphic ⁵
Bar-throated Woodpecker	<i>Piculus capistratus</i>	Dimorphic ⁵
Golden-green Woodpecker	<i>Piculus chrysochloros</i>	Dimorphic ⁵
Yellow-throated Woodpecker	<i>Piculus flavigula</i>	Dimorphic ⁵
Dot-throated Woodpecker	<i>Piculus laemosticus</i>	Dimorphic ⁵
White-throated Woodpecker	<i>Piculus leucolaemus</i>	Dimorphic ⁵
Lita Woodpecker	<i>Piculus litae</i>	Dimorphic ⁵
Belem Woodpecker	<i>Piculus paraensis</i>	Dimorphic ⁵
Atlantic Woodpecker	<i>Piculus polyzonus</i>	Dimorphic ⁵
Rufous-winged Woodpecker	<i>Piculus simplex</i>	Dimorphic ⁵
Golden-yellow Woodpecker	<i>Piculus xanthochlorus</i>	Dimorphic ⁵
White-wedged Piculet	<i>Picumnus albosquamatus</i>	Dimorphic ⁵

Bar-breasted Piculet	<i>Picumnus aurifrons</i>	Dimorphic ⁵
Plain-breasted Piculet	<i>Picumnus castelnau</i>	Dimorphic ⁵
Chestnut Piculet	<i>Picumnus cinnamomeus</i>	Dimorphic ⁵
White-barred Piculet	<i>Picumnus cirratus</i>	Dimorphic ⁵
Ocellated Piculet	<i>Picumnus dorbignyanus</i>	Dimorphic ⁵
Golden-spangled Piculet	<i>Picumnus exilis</i>	Dimorphic ⁵
Tawny Piculet	<i>Picumnus fulvescens</i>	Dimorphic ⁵
Rusty-necked Piculet	<i>Picumnus fuscus</i>	Dimorphic ⁵
Speckled Piculet	<i>Picumnus innominatus</i>	Dimorphic ⁵
Lafresnaye's Piculet	<i>Picumnus lafresnayi</i>	Dimorphic ⁵
Ochraceous Piculet	<i>Picumnus limae</i>	Dimorphic ⁵
Arrowhead Piculet	<i>Picumnus minutissimus</i>	Dimorphic ⁵
Mottled Piculet	<i>Picumnus nebulosus</i>	Dimorphic ⁵
Black-dotted Piculet	<i>Picumnus nigropunctatus</i>	Dimorphic ⁵
Olivaceous Piculet	<i>Picumnus olivaceus</i>	Dimorphic ⁵
Orinoco Piculet	<i>Picumnus pumilus</i>	Dimorphic ⁵
Spotted Piculet	<i>Picumnus pygmaeus</i>	Dimorphic ⁵
Rufous-breasted Piculet	<i>Picumnus rufiventris</i>	Dimorphic ⁵
White-bellied Piculet	<i>Picumnus spilogaster</i>	Dimorphic ⁵
Scaled Piculet	<i>Picumnus squamulatus</i>	Dimorphic ⁵
Speckle-chested Piculet	<i>Picumnus steindachneri</i>	Dimorphic ⁵
Fine-barred Piculet	<i>Picumnus subtilis</i>	Dimorphic ⁵
Ochre-collared Piculet	<i>Picumnus temminckii</i>	Dimorphic ⁵
Varzea Piculet	<i>Picumnus varzeae</i>	Dimorphic ⁵
Japanese Woodpecker	<i>Picus awokera</i>	Dimorphic ⁵
Gray-headed Woodpecker	<i>Picus canus</i>	Dimorphic ⁵
Lesser Yellownape	<i>Picus chlorolophus</i>	Dimorphic ⁵
Black-headed Woodpecker	<i>Picus erythropygius</i>	Dimorphic ⁵
Crimson-winged Woodpecker	<i>Picus puniceus</i>	Dimorphic ⁵
Red-collared Woodpecker	<i>Picus rabieri</i>	Dimorphic ⁵
Iberian Woodpecker	<i>Picus sharpei</i>	Dimorphic ⁵
Scaly-bellied Woodpecker	<i>Picus squamatus</i>	Dimorphic ⁵
Levaillant's Woodpecker	<i>Picus vaillantii</i>	Dimorphic ⁵
Streak-breasted Woodpecker	<i>Picus viridanus</i>	Dimorphic ⁵
Eurasian Green Woodpecker	<i>Picus viridis</i>	Dimorphic ⁵
Laced Woodpecker	<i>Picus vittatus</i>	Dimorphic ⁵
Streak-throated Woodpecker	<i>Picus xanthopygaeus</i>	Dimorphic ⁵
Orange-backed Woodpecker	<i>Reinwardtipicus validus</i>	Dimorphic ⁵

Okinawa Woodpecker	<i>Sapheopipo noguchii</i>	Dimorphic ¹
Rufous Piculet	<i>Sasia abnormis</i>	Dimorphic ⁵
African Piculet	<i>Sasia africana</i>	Dimorphic ⁵
White-browed Piculet	<i>Sasia ochracea</i>	Dimorphic ⁵
Williamson's Sapsucker	<i>Sphyrapicus thyroideus</i>	Dimorphic ⁵
Yellow-bellied Sapsucker	<i>Sphyrapicus varius</i>	Dimorphic ⁵
Red-stained Woodpecker	<i>Veniliornis affinis</i>	Dimorphic ⁵
Scarlet-backed Woodpecker	<i>Veniliornis callonotus</i>	Dimorphic ⁵
Golden-collared Woodpecker	<i>Veniliornis cassini</i>	Dimorphic ⁵
Choco Woodpecker	<i>Veniliornis chocoensis</i>	Dimorphic ⁵
Yellow-vented Woodpecker	<i>Veniliornis dignus</i>	Dimorphic ⁵
Dot-fronted Woodpecker	<i>Veniliornis frontalis</i>	Dimorphic ⁵
Red-rumped Woodpecker	<i>Veniliornis kirkii</i>	Dimorphic ⁵
Striped Woodpecker	<i>Veniliornis lignarius</i>	Dimorphic ⁵
Yellow-eared Woodpecker	<i>Veniliornis maculifrons</i>	Dimorphic ⁵
Bar-bellied Woodpecker	<i>Veniliornis nigriceps</i>	Dimorphic ⁵
Little Woodpecker	<i>Veniliornis passerinus</i>	Dimorphic ⁵
Blood-colored Woodpecker	<i>Veniliornis sanguineus</i>	Dimorphic ⁵
White-spotted Woodpecker	<i>Veniliornis spilogaster</i>	Dimorphic ⁵
Cuban Green Woodpecker	<i>Xiphidiopicus percussus</i>	Dimorphic ⁵
Gray-and-buff Woodpecker	<i>Hemicircus concretus</i>	Dimorphic ⁵

†Extinct.

¹Short (1982), ²Frei et al. (2020), ³Sibley (2014), ⁴Johnson and Johnson (1985), ⁵Gorman (2014),

⁶Selander (1966), ⁷Pasinelli (2000), ⁸Winkler et al. (2010), ⁹Round et al. (2012)