

## Unipedal stance in birds: some observations

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While unipedal posturing and stance is more common among waders and long legged waterfowl – it is not uncommon among passerines. As one who has worked on avian bipedal locomotion and stride, my take on this unusual stance is that while it could well be that 'thermoregulation' and 'resting' are possible factors, there is yet another angle that may require a deeper looking into anatomy.

Birds are unique besides the most evolved mammal, man – they are the only animals that effectively use bipedal locomotion. While biped gait, despite the compromise it imposes on equilibrium and balance confers innumerable compensatory advantages. To illustrate one such limitation to efficiency caused by adopting a biped stance, try swiveling your body with both your legs firmly rooted to the ground. This movement is restricted to the upper half of the body is produced by a clockwise (or counter clockwise) rotation at the inter-vertebral joints. No part of the skeleton below the last lumbar partakes in the performance of this rotatory exercise.

Now stand on one leg and repeat the swivel: observe how your body covers a wider range of movement left or right than when swiveling was done with both legs grounded. The extra range of pivot accrued through unipedal stance is because you have now included an additional joint in your exertion – the ilio-femoral (hip) joint. The hip is an enarthrodial (ball and socket), synovial, multi-axial articulation that allows a wide variety of movements. The spheroidal head of femur fits into the cup shaped acetabular cavity of the hip bones permits free swivel of the body on the hip 'pivot': Swiveling (pivoting) on one

leg increases the range of rotation to left or right, quite dramatically. The range of medial or lateral rotation can be accentuated additionally by using the free leg as a propelling handle – many waders rest their free limb against the one they are standing on. The free limb abutting or hooked on to the standing limb, initiates the movement, which usually is biomechanically near impossible without the 'shove' impetus. Interpolating the rationale and logic, it is reasonable to interpret that while standing on one leg could be to rest the other or help in conserving body temperature to an extent – the more significant gain could be that the bird frees itself from limitation in range rotation (swivel) engendered by the biped stance. In waders, water birds or passerines 'in rest', the one legged stance gives an advantage – ability to swing this way or that more effectively and remain alert to prey or peril, notwithstanding the compromise in stability it imposes

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