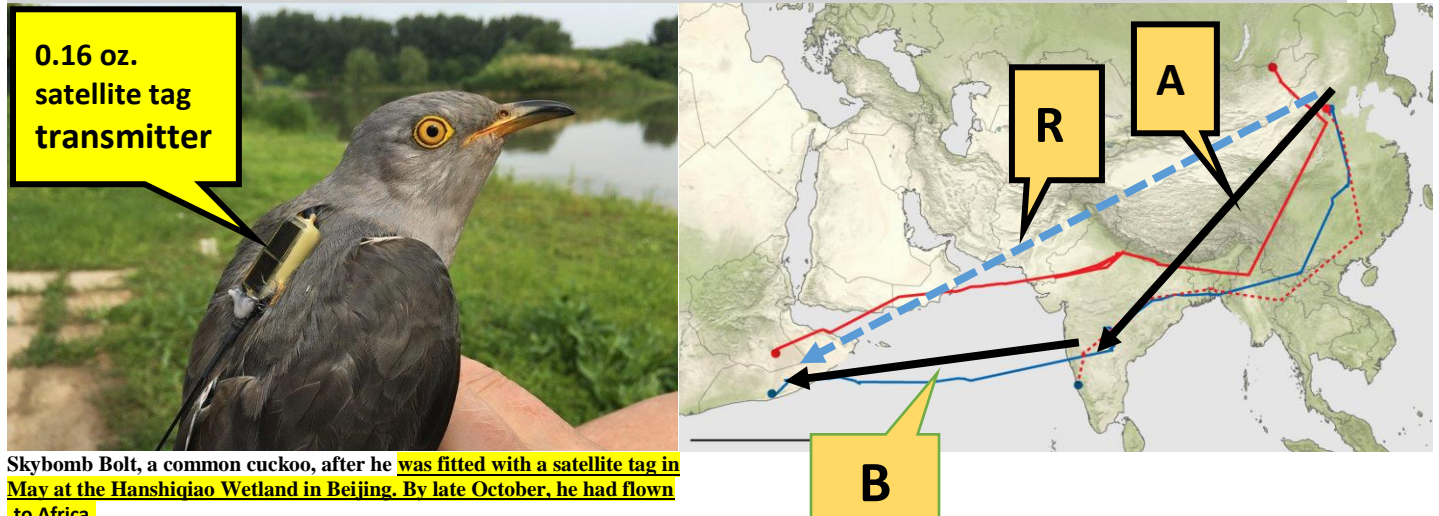


VECTORS

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With a Cuckoo's Journey From China, a Mystery Is Solved, and Cheers Go Up



Skybomb Bolt, a common cuckoo, after he was fitted with a satellite tag in May at the Hanshiqiao Wetland in Beijing. By late October, he had flown to Africa.

BEIJING — When Flappy McFlapperson and Skybomb Bolt sprang into the sky for their annual migration from wetlands near Beijing, nobody was sure where the two cuckoos were going. They and three other cuckoos had been tagged with sensors to follow them from northern China. But to where? “These birds are not known to be great fliers,” said [Terry Townshend](#), a British amateur bird watcher living in the Chinese capital who helped organize the [Beijing Cuckoo Project](#) to track the birds. “The answer to the mystery — unfolding in passages recorded by satellite for more than five months — has been a humbling revelation even to many experts. The birds’ journeys have so far covered thousands of miles, across a total of a dozen countries and an ocean. The “common cuckoo,” as the species is called, turns out to be capable of exhilarating odysseys. “It’s impossible not to feel an emotional response,” said [Chris Hewson](#), an ecologist with the [British Trust for Ornithology](#) in Thetford, England, who has helped run the tracking project. “There’s something special about feeling connected to one small bird flying across the ocean or desert.” As well as Flappy and Skybomb, there was Hope, Zigui and [Meng Zhi Juan, a poetic Chinese phrase meaning “dream bird.”](#) By mid-September, Skybomb and Flappy were in India. That more or less ruled out the idea that they were headed to Southeast Asia, and they appeared likely to head west. But by which route? The first answer came in late October. [Skybomb struck out boldly from central India and, without stopping, headed across the northern Indian Ocean, apparently aiming to reach Africa in one lunge.](#) By the second day, he was halfway across. After a third day, the east coast of Africa, and food and rest, beckoned. On Oct. 31, Mr. Townshend announced on Twitter that Skybomb “is in Africa!” Sixty-four days after he had begun his migration, the cuckoo had reached the coast of Somalia about an hour after dusk. He had flown nonstop for 2,300 miles from central India. “What a bird!” Mr. Townshend declared.

INTRODUCTION: Vector A (Beijing to India) is 3500 miles @ 45° south of west. Vector B (India to Africa) is 2300 miles @ 10° south of west.

QUESTIONS A: (for General College Physics students) Find magnitude and direction of resultant of A + B vectors?

QUESTIONS B: If you are a Engineering Physics student you must do both question sets A and B: (a) Find vector A in vector notation format? e.g. $A = A_x i + A_y j$, (b) Find vector B in vector format? e.g. $B = B_x i + B_y j$, (c) Find resultant vector R in vector notation format?, e.g. $R = R_x i + R_y j$, (d) Find A dot B (dot product)?, (e) Find angle between vector A and vector B?, (f) Find cross product of $A \times B$?, (g) Find cross product of $B \times A$?

HINTS: Consider the earth’s surface as a X Y Cartesian coordinate grid. Find components of vector A and B to answer questions B (a) & (b).