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The atypical small G protein Rab-like 5 has been shown to traffic in sensory cilia of *Caenorhabditis elegans*, where it participates in signalling processes but not in cilia construction. In this report, we demonstrate that RABL5 colocalises with intraflagellar transport (IFT) proteins at the basal body and in the flagellum matrix of the protist *Trypanosoma brucei*. RABL5 fused to GFP exhibits anterograde movement in the flagellum of live trypanosomes, suggesting it could be associated with IFT. Accordingly, RABL5 accumulates in the short flagella of the retrograde IFT140RNAi mutant and is restricted to the basal body region in the IFT88RNAi anterograde mutant, a behaviour that is identical to other IFT proteins. Strikingly, RNAi silencing reveals an essential role for RABL5 in trypanosome flagellum construction. RNAi knock-down produces a phenotype similar to inactivation of retrograde IFT with formation of short flagella that are filled with a high amount of IFT proteins. These data reveal for the first time a functional difference for a conserved flagellar matrix protein between two different ciliated species and raise questions related to cilia diversity.