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# The Reovirales a new taxonomic order: families Sedoreoviridae and Spinareoviridae

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Family *Reoviridae* contains 15 distinct genera, classified within two subfamilies *Spinareovirinae* (turreted) and *Sedoreovirinae* (non-turreted) that are recognised by the International Committee on Taxonomy of Viruses (ICTV). Analysis of RdRp sequences suggests that the turreted and non-turreted reoviruses evolved from a common ancestor.

It has been recently suggested that RdRps of turreted reoviruses are more closely related to those of birnaviruses than to RdRps of non-turreted reoviruses. However, several findings argue against this suggestion: 1-Birnavirus RdRp is a Vpg and thus distinct from the RdRps of reoviruses; 2-Reovirus RdRp uses a fully conservative mechanism, while birnavirus RdRp is semi-conservative and in this respect is more like a DNA polymerase; 3-Birnavirus RdRp possesses a reverse-transcriptase activity, bringing it closer to DNA polymerases; 4-Infectious bursal disease virus (a birnavirus) RdRp reveals a characteristic rearrangement of motifs, from A–B–C to C–A–B, in the RNA polymerase catalytic palm domain, which is not found in RdRps from other dsRNA viruses. In addition birnaviruses have only two genome-segments, one of which encodes a polyprotein, again distinguishing them from reoviruses. Although members of family *Birnaviridae* possess a T13 capsid, like reoviruses, the evolutionary origin of these capsids is distinct.

Based on conserved structural and functional properties and despite high genetic diversity between genera of the family *Reoviridae*, we propose the creation of a new taxonomic level - the order 'Reovirales'. Collectively these data suggest that this order should only encompass families Sedoreoviridae and Spinareoviridae, which correspond to the current subfamilies of the *Reoviridae*.