Kashmir Bee Virus

Comprehensive Findings Review

Synthesised from the abstracts and full texts of the most-cited and representative papers within a harvested corpus of 514 records (447 open access). A curated review of landmark findings, not an exhaustive catalogue. Generated 2026-06-12.

Executive Summary

Kashmir bee virus (KBV) is a positive-sense, single-stranded RNA virus of the family **Dicistroviridae** and a member of the **ABPV–KBV–IAPV (AKI) complex**. Originally detected in the Asian honey bee *Apis cerana* and later established in the Western honey bee *Apis mellifera*, KBV is widely regarded as the **most virulent** of the bee viruses on direct injection — capable of killing adult bees within days at very low doses. As with the rest of the AKI complex, it normally persists as a covert, asymptomatic infection and becomes lethal when amplified and vectored by the mite *Varroa destructor*. KBV is frequently implicated in colony losses, and its titre dynamics track *Varroa* infestation closely. This document synthesises the findings by theme and catalogues the landmark studies.

Family	Dicistroviridae; positive-sense ssRNA (~9–10 kb)
Complex	Member of the ABPV–KBV–IAPV (AKI) complex of closely related viruses (de Miranda 2010)
Origin	First detected in Apis cerana (Kashmir region); now established in A. mellifera
Virulence	Considered the most virulent bee virus on injection — lethal at very low doses
Pathology	Covert at low titre; rapid paralysis and death at high titre
Vector	Varroa destructor — disseminates and activates KBV; titres track mite infestation (Mondet 2014)
Prevalence	Lower than ABPV in Europe (17% of French apiaries, adults); higher impact in Oceania (Tentcheva 2004)

Origin, Taxonomy and the AKI Complex

Kashmir bee virus was first identified in the Asian honey bee *Apis cerana* and subsequently found in the Western honey bee *Apis mellifera*, in which it has become an important pathogen. It belongs to the family **Dicistroviridae** and is one of the three members of the **AKI complex** alongside acute bee paralysis virus (ABPV) and Israeli acute paralysis virus (IAPV) (de Miranda 2010). The three are so closely related — sharing genome organization and serological cross-reactivity — that accurate molecular diagnostics are needed to tell them apart, and they recombine with one another (de Miranda 2010).

Virulence and Pathology

KBV is widely described as the most virulent of the honey bee viruses when introduced directly into the haemocoel: it can kill adult bees within about three days at very low doses. Yet, like its AKI relatives, it predominantly persists as a covert, sub-clinical infection, with the extreme virulence emerging only at elevated titres reached artificially or naturally (de Miranda 2010). This covert/overt duality — harmless commensal versus rapid killer — is governed by infection route and titre, which is precisely what the *Varroa* mite manipulates by delivering virus directly into the bee.

The Varroa Connection and Colony Losses

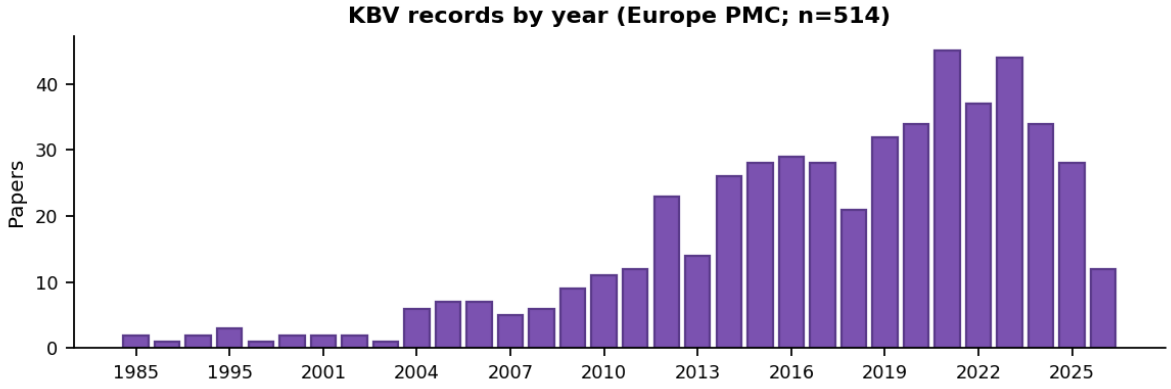
KBV's status as a colony threat is tied to *Varroa destructor*. The mite disseminates the AKI viruses between and within colonies and activates their multiplication in larvae and adults (Genersch 2010).

Along a decade-long *Varroa* expansion front in New Zealand, the dynamic shifts in KBV titres (together with black queen cell virus) mirrored the changing patterns of mite infestation — direct field evidence that KBV epidemiology is coupled to the mite (Mondet 2014). KBV has been a particularly significant cause of *Varroa*-associated colony mortality in parts of Oceania.

Prevalence, Distribution and Transmission

KBV's prevalence varies geographically. In a large French survey it was the least common of the six viruses screened, present in 17% of apiaries (adult bees), 6% of pupae and 5% of *Varroa* samples (Tentcheva 2004), whereas it has historically been more prominent in Australia and New Zealand. KBV is transmitted by the mite, orally via contaminated food (picorna-like viruses of this group occur in pollen and are infective; Singh 2010), and vertically from queens to offspring (Chen 2006). As one of the most widely distributed bee viruses, its spread is also aided by global trade in bees (Beaurepaire 2020).

Research Activity



Landmark Study Catalogue

Selected by citation impact and thematic importance. Core studies:

de Miranda 2010 — The Acute bee paralysis virus–Kashmir bee virus–Israeli acute paralysis virus complex (review) (2010, J. Invertebrate Pathology; cited 191)

Comprehensive review of the AKI dicistrovirus complex including KBV.

- KBV is part of a complex of closely related Dicistroviridae (with ABPV and IAPV) of widespread prevalence.
- Predominantly sub-clinical etiology contrasts with extreme virulence at elevated titres.
- Frequently implicated in colony losses, especially under Varroa destructor infestation.
- Reviews KBV origins, host/tissue distribution, pathology, transmission, genetics and diagnostics.

None · doi:10.1016/j.jip.2009.06.014

Genersch 2010 — Emerging and re-emerging viruses of the honey bee (review) (2010, Veterinary Research; cited 164)

Reviewed how Varroa elevated the virulence of previously harmless bee viruses incl. KBV.

- The AKI Dicistroviridae acquired virulence in Europe/USA in relation to Varroa destructor.
- Varroa acts as both disseminator of the viruses and activator of their multiplication.
- Control options remain limited in the short term.

PMC2883145 · doi:10.1051/vetres/2010027

Mondet 2014 — Quantitative virus dynamics along a new Varroa expansion front (New Zealand) (2014, PLoS Pathogens; cited 169)

Tracked viral landscapes as Varroa spread across New Zealand over a decade.

- Dynamic shifts in KBV titres (with BQCV) mirrored the changing patterns of Varroa infestation along the front.
- Provides direct field evidence that KBV epidemiology is coupled to mite infestation dynamics.
- Contrasts with DWV, whose titres kept rising even as infestation rates dropped.

PMC4140857 · doi:10.1371/journal.ppat.1004323

Tentcheva 2004 — Prevalence and seasonal variations of six bee viruses in France (2004, Applied & Environmental Microbiology; cited 285)

Large-scale PCR survey of six viruses across 36 French apiaries and their mites.

- KBV was the least prevalent of the six viruses: 17% of apiaries (adults), 6% (pupae), 5% of Varroa samples.
- Infections persisted without clinical signs, implying environmental activation of replication.

PMC535170 · doi:10.1128/aem.70.12.7185-7191.2004

Supporting studies:

Chen 2006 — Prevalence and transmission of honeybee viruses (2006, Applied & Environmental Microbiology; cited 165)

Examined queen tissues and offspring for six viruses including KBV.

- KBV detected in queen tissues; viruses present in queens appeared in eggs, larvae and workers — vertical transmission.

PMC1352288 · doi:10.1128/aem.72.1.606-611.2006

Singh 2010 — RNA viruses in hymenopteran pollinators: inter-taxa transmission via pollen (2010, PLoS ONE; cited 283)

Surveyed viruses in bees, pollen and non-Apis pollinators.

- Picorna-like viruses of this group detected in pollen and shown to be infective.
- Detected across multiple non-Apis pollinators — relevant to KBV's host range.

PMC3008715 · doi:10.1371/journal.pone.0014357

Beaurepaire 2020 — Diversity and Global Distribution of Viruses of the Western Honey Bee (review) (2020, Insects; cited 132)

Synthesised global diversity and distribution of A. mellifera viruses.

- The acute paralysis complex (incl. KBV) is among the most widely distributed bee viruses.
- Global trade contributes to dissemination; many are multi-host pathogens.

PMC7240362 · doi:10.3390/insects11040239

Scope note: studies excluded as off-topic

- **Fisher 2012 / Vanengelsdorp 2009 / Cornman 2012 / Hristov 2020**: Fungal-threat and CCD descriptive studies — KBV is one of many factors, not the focus.
- **Lanzi 2006 / Highfield 2009 / McMahon 2016 / Chen 2005**: DWV-specific papers surfaced via shared multi-virus surveys.
- **Yang 2005 (immunosuppression)**: Varroa-DWV immunosuppression mechanism — relevant context but DWV-focused.
- **Dussaubat 2012 / Gisder 2010 (Nosema)**: Nosema ceranae studies — different pathogen.

References

Tentcheva 2004. *Prevalence and seasonal variations of six bee viruses in France.* Applied & Environmental Microbiology (2004). doi:10.1128/aem.70.12.7185-7191.2004 · PMC535170

Chen 2006. *Prevalence and transmission of honeybee viruses.* Applied & Environmental Microbiology (2006). doi:10.1128/aem.72.1.606-611.2006 · PMC1352288

Genersch 2010. *Emerging and re-emerging viruses of the honey bee (review).* Veterinary Research (2010). doi:10.1051/vetres/2010027 · PMC2883145

Singh 2010. *RNA viruses in hymenopteran pollinators: inter-taxa transmission via pollen.* PLoS ONE (2010). doi:10.1371/journal.pone.0014357 · PMC3008715

de Miranda 2010. *The Acute bee paralysis virus–Kashmir bee virus–Israeli acute paralysis virus complex (review).* J. Invertebrate Pathology (2010). doi:10.1016/j.jip.2009.06.014

Mondet 2014. *Quantitative virus dynamics along a new Varroa expansion front (New Zealand).* PLoS Pathogens (2014). doi:10.1371/journal.ppat.1004323 · PMC4140857

Beaurepaire 2020. *Diversity and Global Distribution of Viruses of the Western Honey Bee (review).* Insects (2020). doi:10.3390/insects11040239 · PMC7240362

Provenance & caveat. Curated synthesis of landmark KBV studies from a corpus of 514 records (447 open access); not exhaustive. Findings are from the cited papers' abstracts and full texts; values are as reported by the original authors. Not peer-reviewed — verify against the cited DOIs. KBV is one of three viruses in the ABPV–KBV–IAPV (AKI) complex.