Acute Bee Paralysis Virus

Comprehensive Findings Review

Synthesised from the abstracts and full texts of the most-cited and representative papers within a harvested corpus of 679 records (596 open access). A curated review of landmark findings, not an exhaustive catalogue. Generated 2026-06-12.

Executive Summary

Acute bee paralysis virus (ABPV) is a positive-sense, single-stranded RNA virus of the family **Dicistroviridae** and the namesake of the **ABPV–KBV–IAPV (AKI) complex** of closely related honey bee viruses. First described in the 1960s, ABPV is widespread and typically persists as a covert, asymptomatic infection — but at elevated titre it is acutely lethal, causing rapid paralysis and death of adults and brood. Its transformation from a harmless commensal into a significant cause of colony mortality is tied directly to the mite *Varroa destructor*, which both disseminates ABPV between bees and activates its replication within them (Genersch 2010; de Miranda 2010). ABPV is among the most virulent bee viruses on direct injection, yet its overall impact is governed by the covert/overt balance that the mite controls. This document synthesises the findings by theme and catalogues the landmark studies.

Family	Dicistroviridae; positive-sense ssRNA (~9–10 kb)
Complex	Namesake of the ABPV–KBV–IAPV (AKI) complex of closely related viruses (de Miranda 2010)
Discovery	Described in the 1960s, originally as a contaminant of chronic bee paralysis virus preparations
Pathology	Covert at low titre; acute paralysis and rapid death of adults and brood at high titre
Vector	Varroa destructor — disseminates ABPV and activates its multiplication (Genersch 2010)
Prevalence	Found in 58% of French apiaries (adults) and 36% of Varroa samples (Tentcheva 2004)
Transmission	Vector-borne, oral/food-borne and vertical (queen→offspring) (Chen 2006; Singh 2010)

Taxonomy and the AKI Complex

ABPV is a member of the family **Dicistroviridae** and forms, together with Kashmir bee virus (KBV) and Israeli acute paralysis virus (IAPV), the closely related **AKI complex** (de Miranda 2010). These three viruses share genome organization, serological cross-reactivity and a characteristic biology: widespread prevalence in honey bee colonies, a predominantly sub-clinical etiology, and extreme virulence at elevated titres — whether induced artificially or reached naturally. Because the members are so similar and recombine, careful molecular diagnostics are needed to distinguish them (de Miranda 2010).

Pathology and Virulence

ABPV is one of the most acutely virulent honey bee viruses. At low titre it is a covert, asymptomatic infection; when injected or amplified to high titre it causes rapid paralysis and death of both adult bees and brood within days. This stark contrast between a near-harmless covert state and lethal overt disease is the defining feature of the AKI complex (de Miranda 2010). The key determinant of which state prevails is the route and level of infection — direct introduction into the haemocoel (as the mite provides) bypasses the gut barriers that normally keep the virus covert, allowing explosive, lethal replication.

The Varroa Connection

ABPV's emergence as a colony-killer is bound to the spread of *Varroa destructor*. Before the mite, the AKI viruses were generally considered harmless; epidemiological surveys and laboratory experiments then linked their newly acquired virulence in Europe and the USA to *Varroa* acting as both a **disseminator** of the virus between and within colonies and an **activator** of viral multiplication in larvae and adults (Genersch 2010). Field surveys consistently find ABPV in *Varroa* mites — for example in 36% of mite samples in a large French survey — supporting the mite's role in transmission (Tentcheva 2004).

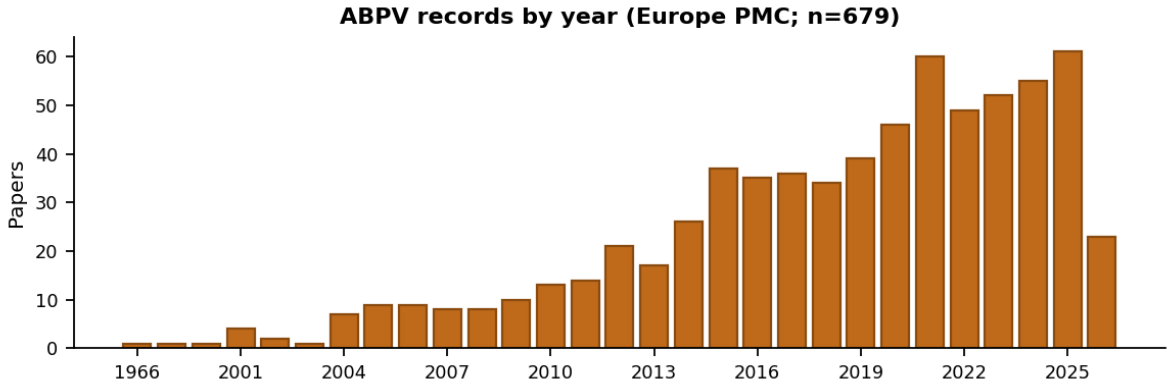
Prevalence, Distribution and Colony Losses

ABPV is common but variable. A large French survey found ABPV in 58% of apiaries in adult bees and 23% in pupae, with persistent infection despite the absence of clinical signs — implying environmental triggers activate replication (Tentcheva 2004). ABPV is part of the acute-paralysis clade identified in monitoring studies as a lethal pathogen for entire colonies (McMenamin 2015), and it is among the most widely distributed bee viruses alongside DWV, SBV and BQCV (Beaurepaire 2020). Its contribution to overwintering losses is real but generally secondary to DWV in *Varroa*-infested colonies (Dainat 2012).

Transmission Routes

ABPV uses the transmission routes typical of bee viruses. It is vectored by *Varroa* (Genersch 2010); transmitted orally via contaminated food, with picorna-like viruses of this group detected in pollen and shown to be infective (Singh 2010); and transmitted vertically — viruses of this group are passed from queens to offspring through eggs (Chen 2006). The interplay of covert vertical maintenance and overt, mite-amplified horizontal spread mirrors the pattern seen across the AKI complex and DWV.

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 that ABPV anchors.

- ABPV, KBV and IAPV form a complex of closely related Dicistroviridae with widespread prevalence.
- Predominantly sub-clinical etiology contrasts with extreme virulence at elevated titres (induced or natural).
- Frequently implicated in colony losses, especially under Varroa destructor infestation.
- Reviews origins, geographic/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 transformed previously harmless bee viruses including ABPV.

- Until the late 1980s ABPV and relatives were considered harmless.
- Their newly acquired virulence in Europe/USA was linked to Varroa destructor.
- Varroa acts as a disseminator of the AKI viruses and an activator of their multiplication in larvae and adults.
- Control options (tolerant bees, RNAi, biosecurity) unlikely to help short-term.

PMC2883145 · doi:10.1051/vetres/2010027

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.

- ABPV found in 58% of apiaries (adult bees) and 23% (pupae).
- ABPV detected in 36% of Varroa samples — supporting the mite's transmission role.
- Infections persisted without clinical signs, implying environmental activation of replication.

PMC535170 · doi:10.1128/aem.70.12.7185-7191.2004

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

Examined queen tissues and offspring for six viruses including ABPV.

- Viruses of this group were detected in queen feces and reproductive tissues.
- Viruses present in queens appeared in their eggs, larvae and adult workers — vertical transmission.

PMC1352288 · doi:10.1128/aem.72.1.606-611.2006

Supporting studies:

McMenamin 2015 — Honey bee colony losses and associated viruses (review) (2015, Current Opinion in Insect Science; cited 149)

Reviewed correlative and experimental evidence linking viruses to colony losses.

- Identified the deformed wing virus and acute bee paralysis virus clades as lethal pathogens for entire colonies.
- Highlighted Varroa as mechanical and biological vector enhancing virulence of certain viruses.

None · doi:10.1016/j.cois.2015.01.015

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 detected in pollen pellets; virus-contaminated food was infective.
- Supports pollen/food-borne transmission and presence in non-Apis pollinators relevant to ABPV.

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 is among the most prevalent and most widely distributed bee viruses.
- Global trade contributes to dissemination; many of these viruses are multi-host.

PMC7240362 · doi:10.3390/insects11040239

Dainat 2012 — Dead or alive: DWV and Varroa reduce the life span of winter honeybees (2012, Applied & Environmental Microbiology; cited 219)

Linked pathogens to winter-bee longevity over a 6-month monitoring.

- ABPV load was positively correlated with vitellogenin expression but, unlike DWV, was not the primary driver of reduced winter-bee lifespan.
- Positions ABPV as a secondary contributor relative to DWV in Varroa-infested colonies.

PMC3273028 · doi:10.1128/aem.06537-11

Locke 2012 — Acaricide treatment affects viral dynamics in Varroa-infested colonies (2012, Applied & Environmental Microbiology; cited 112)

Tracked viral dynamics during acaricide (tau-fluvalinate) treatment.

- Showed acaricide treatment and host physiology, not just mite load, shape viral titres.
- Illustrates that managing Varroa modulates the dicistrovirus/DWV burden, relevant to ABPV control.

PMC3255632 · doi:10.1128/aem.06094-11

Scope note: studies excluded as off-topic

- **Vanengelsdorp 2009 / Cornman 2012 / Johnson 2009 / Bromenshenk 2010 / Hristov 2020**: CCD descriptive/pathogen-web studies — ABPV is one of many factors, not the focus.
- **Lanzi 2006 / Chen 2005 / Highfield 2009 / McMahon 2016**: DWV-specific papers that surfaced via shared surveys.
- **Li 2010 / Djikeng 2009 / Baird 2006 / Luke 2008**: Bat-guano/freshwater viromes and IRES/2A-peptide molecular virology — not ABPV-specific (matched via 'dicistrovirus'/'virus').
- **Dussaubat 2012 / Gisder 2010 (Nosema) / Fairbrother 2014 (neonics)**: Nosema or pesticide studies — different stressor.

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

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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

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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 ABPV studies from a corpus of 679 records (596 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. ABPV is one of three viruses in the ABPV–KBV–IAPV (AKI) complex.