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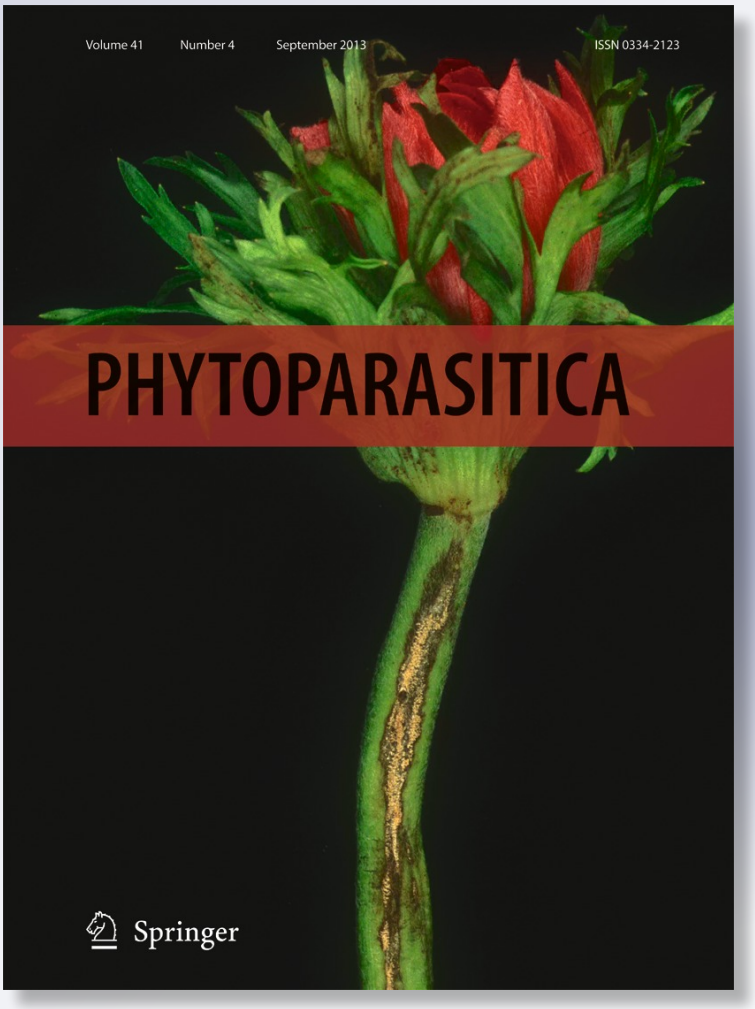

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First detection of *Deformed wing virus* of honeybees in Algeria

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Abstract *Deformed wing virus* (DWV) is reported for the first time in honeybee colonies in Algeria.

Keywords *Apis mellifera intermissa* · RT-PCR

Deformed wing virus (DWV) is a very common virus infecting honeybee in all developmental stages and castes (Chen *et al.* 2005; Tentcheva *et al.* 2006; Yue & Genersch 2005) and has become one of the most common honeybee viruses in the world (Gülmez *et al.* 2009). DWV causes characteristic wing deformities, shortened abdomens and a severely reduced lifespan of adult honeybees (de Miranda & Genersch 2010; Yue & Genersch 2005). To date there is no information about viral honeybee diseases in Algeria or even most of the North African region. However, symptoms such as wing deformities were observed by beekeepers in some apiaries in Algeria. The aim of the present work was to investigate the presence of DWV in *Apis mellifera intermissa* from apiaries of different regions in Algeria using one-step reverse transcription-PCR (RT-PCR).

Adult worker bee samples were collected from 40 widely separated apiaries situated in eight different regions of northern Algeria (Fig. 1). Bees in colonies showing pathological symptoms of deformed wing syndrome were collected and stored at −80°C until RNA extraction. Total RNA of each honeybee sample was extracted using standard methods following the manufacturer's protocol (RNeasy kit; Qiagen). All RNA samples were quantified and qualified using NanoDrop 2000 (Thermo Fischer Scientific), and then stored at −80°C. One-step RT-PCR was performed according to standard protocols (one-step RT-PCR kit; Qiagen) and as described by Genersch (2005) using 0.5 g total RNA. In all RT-PCR reactions the

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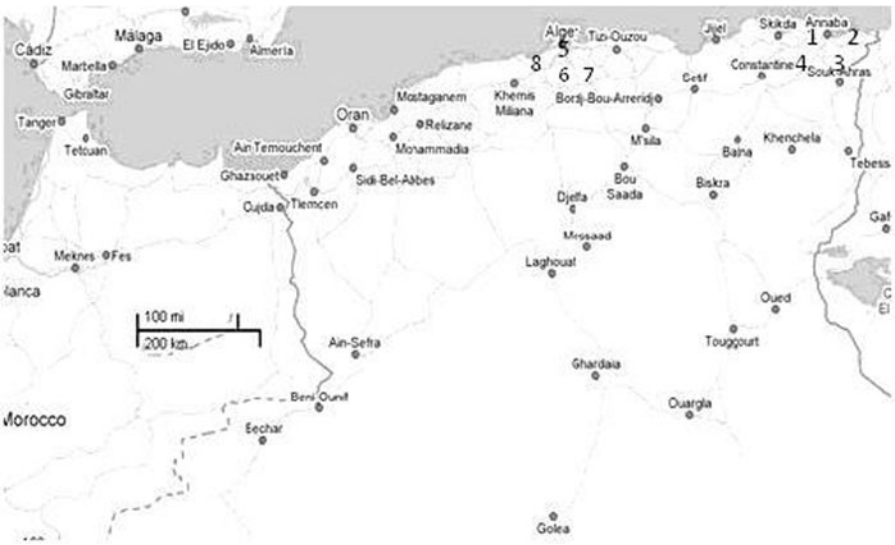

Fig. 1 Localization of the regions where samples were collected in Algeria

following cycling conditions were used: 30 min at 50°C, 10 min at 95°C followed by 40 cycles with 30 s at 94°C, 30 s at 65°C, 30 s at 72°C, and a final elongation step of 7 min at 72°C. In all tests, the reaction volume was 50 µl. A PCR product of 194 bp was amplified using 0.1 M specific forward (5′ CTTACTCTGCCGTCGCCCA 3′) and 0.1 M reverse (5′ CCGTTAGGAACTCATTATCGCG 3′) primers. In all tests ddH2O was used as negative control, PCR products of 10 µl were analyzed on a 1.5% agarose gel containing ethidium bromide and visualized on a UV transilluminator.

Results show that of the 40 apiaries examined, 40% were infected with DWV (Fig. 2).

This is the first molecular report of the presence of DWV in Algeria and in North Africa. DWV has been reported from different parts of Asia, Europe, Africa, the USA, and western Canada (Berenyi *et al*. 2007; Gülmez *et al*. 2009; Haddad *et al.* 2008; Tentcheva *et al.* 2004). In conclusion, an epidemiological survey on DWV and other honeybee viruses covering most parts of the country should be conducted in order to determine the distribution and the prevalence of honeybee viruses in Algerian apiaries.

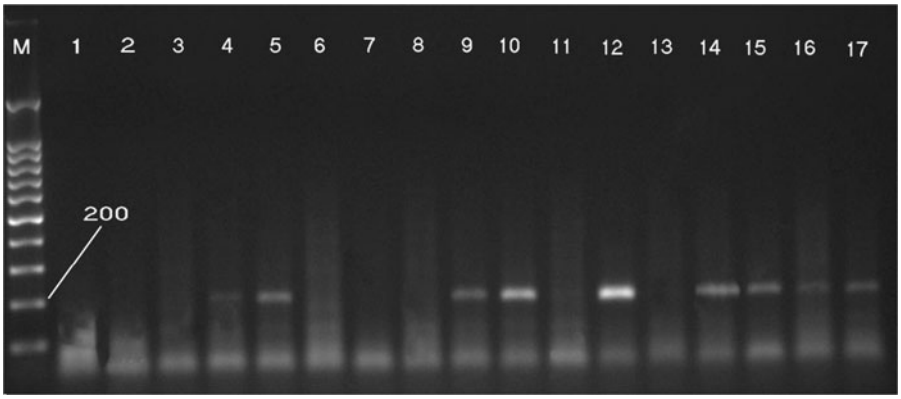

Fig. 2 Shows samples 4, 5,9,10,12,14,15 and 16 are infected with DWV. 194 bp bands appear in the figure, positive control included in lane No. 17, and lane (M) molecular marker

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