

Risk assessment of an exotic carpenter bee and associating mites introduced with processed bamboo



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In the Japanese plant quarantine,

All the plants are, as a rule, subject to import inspection. However, some plant products are exempted from import inspection. They are, for example, highly **processed products** such as wooden furniture, tea, canned or bottled products packed in sealed containers, which are free from the risk of recontamination. In any case, not all the '*processed plant products*' are exempted from import inspection.



Incisitermes minor



Lyctus brunneus



Outline

- Introduction of an exotic carpenter bee with associating mites with processed bamboo- where they are from
- Risk assessment of the bee and mite
- Prediction of expansion of the bee and mite in Japan

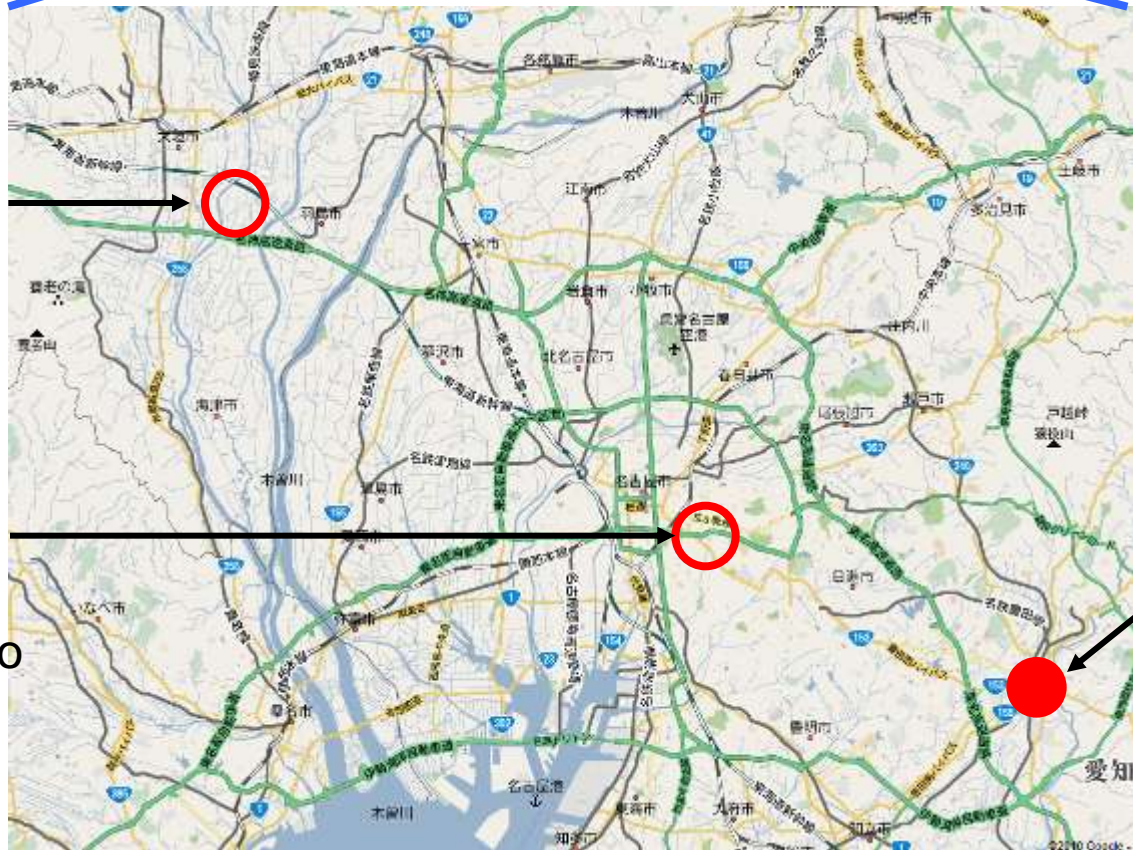
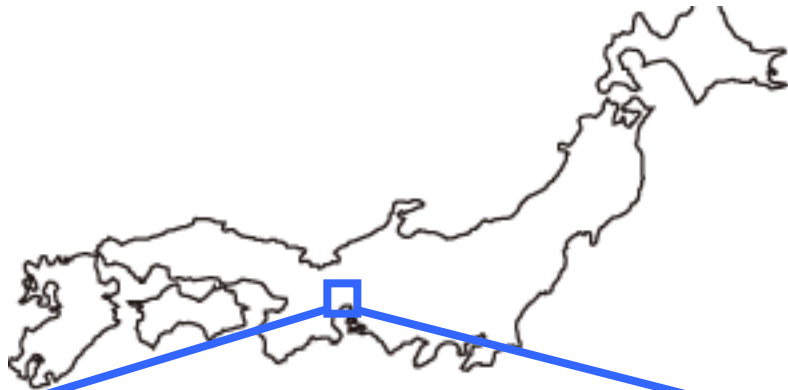
Distribution of *Xylocopa tranquebarorum*



Since around 2005, a “strange carpenter bee” has been reported around...



Xylocopa tranquebarorum



Anpachi, Gifu
In 2006

Nagoya
In 2009

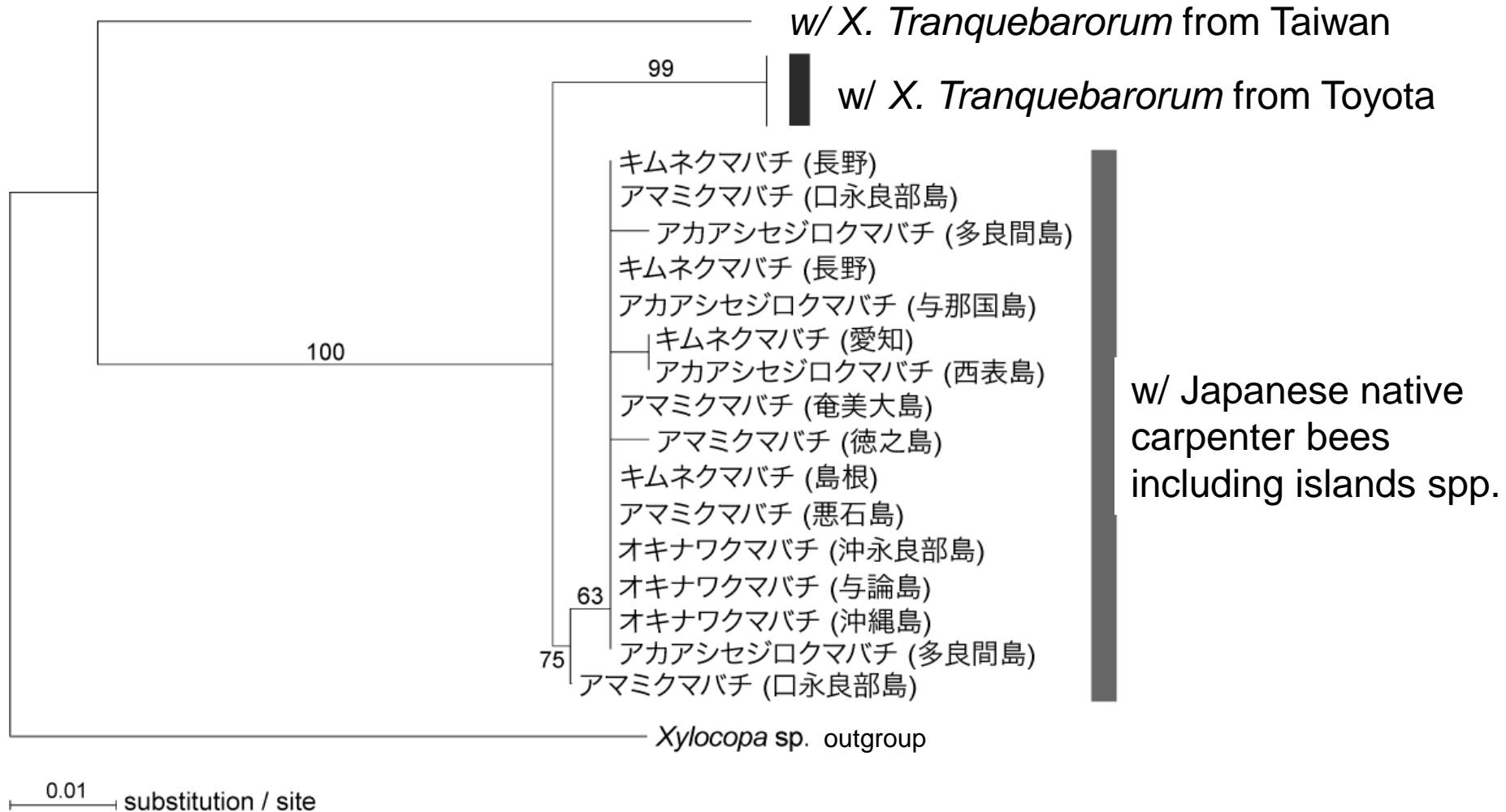
ca 250km from Tokyo

Toyota around
Yahagi River
In 2006

10Km

By the way, where the mite was from?

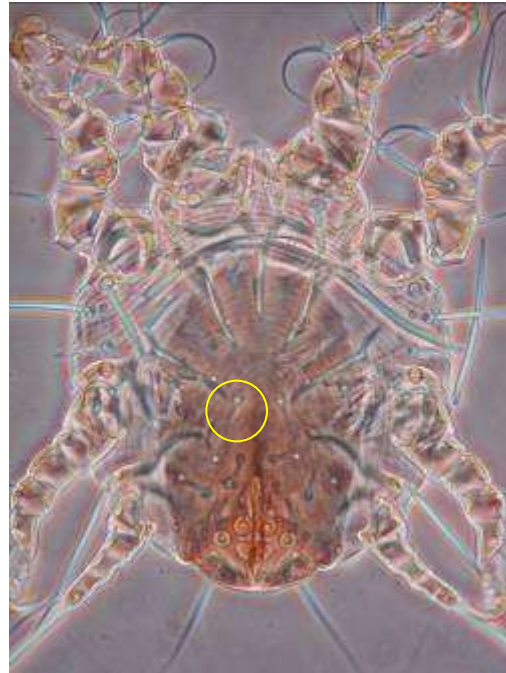
Not from Taiwan or Japan



Molecular phylogeny based on ITS2

So, where are they from?

Probably
Sennertia potanini
in western China



Exotic species in Toyota

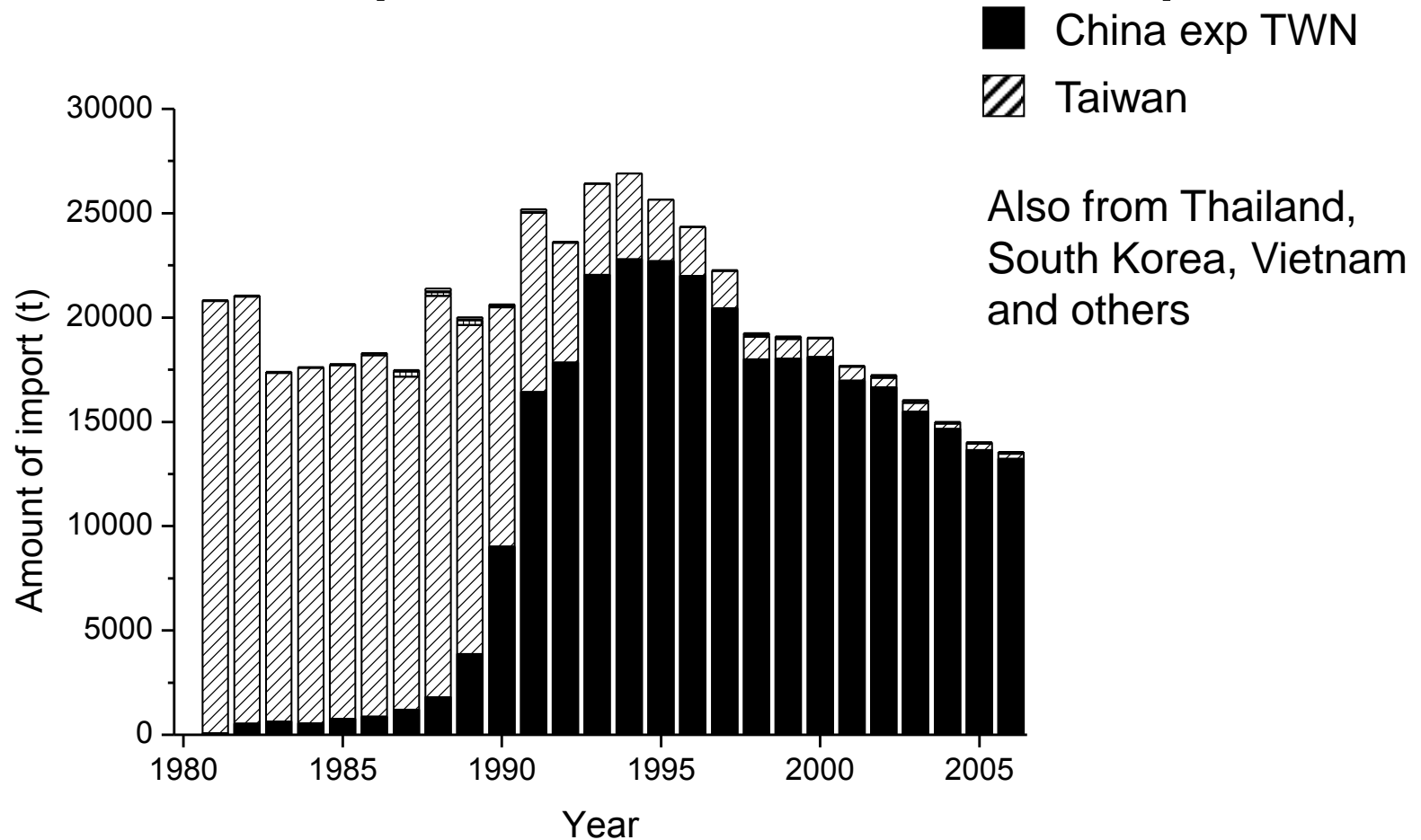
100µm



Sennertia horrida in TWN



Statistic of imported bamboo in Japan



It suggests that the carpenter bees and mite came from the mainland China together with processed bamboo

Expected risks from the bee & mite

Risks of the exotic carpenter bee

- 1) sting by the bee
- 2) degradation of bamboo materials
- 3) economic loss of bamboo business
- 4) resource competition with native species



Risks of the mite associated with the bee

- 1) house-dust
- 2) vectoring diseases
- 3) genetic contamination with the native mite
- 4) parasitizing of the native carpenter bee

Risks from the carpenter bee

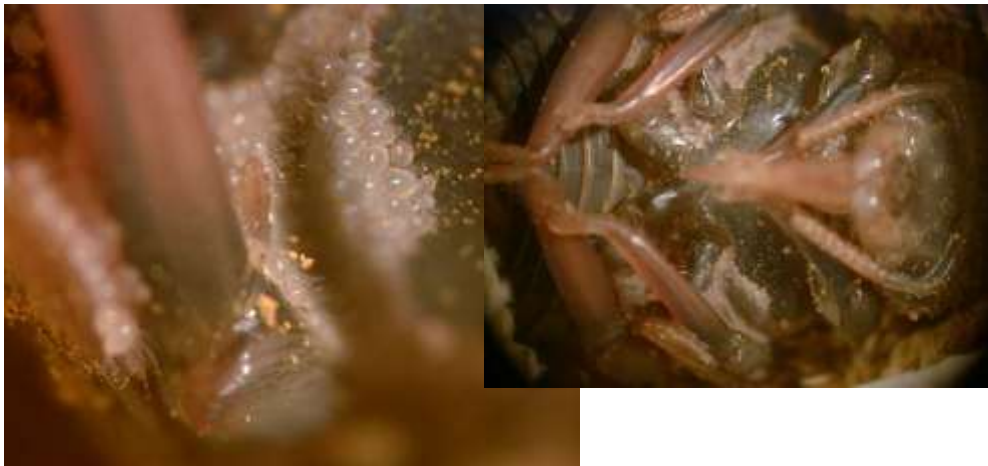
- sting by the bee
 - possible, particularly in farmlands and gardens
- degradation of bamboo materials
 - it happened in residential areas
- economic loss of bamboo business
 - local retailers have problems
- resource competition with native species
 - not with the native carpenter bee but the effects on smaller bees are unknown

The mite risk as house dust – prob. zero



During host nesting, the mite in the dispersal stage migrates into the nest and molts

Increasing in numbers feeding on host food and feces



A little before to after host emerging, the mite becomes the dispersal stage



Overwintering w/ the host

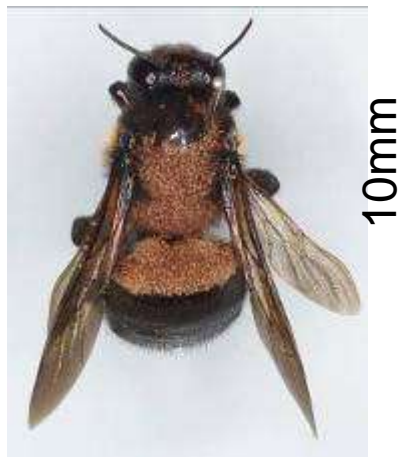
The mite did not seem to vector a bee disease

	No. of nests ^a	No. of provisioned cells	No. of cells with bees	No. of emerged bees ^b
Mite-laden	22 (1)	101	87	49 (33)
Mite-free	10 (3)	22	20	5 (4)*

^a Total number of nests (number of unprovisioned nests).

^b Total number of emerged adults (number of emerged females).

* Sex ratio between mite-laden and mite-free offspring was tested using Fisher's exact tests; $P < 0.05$.

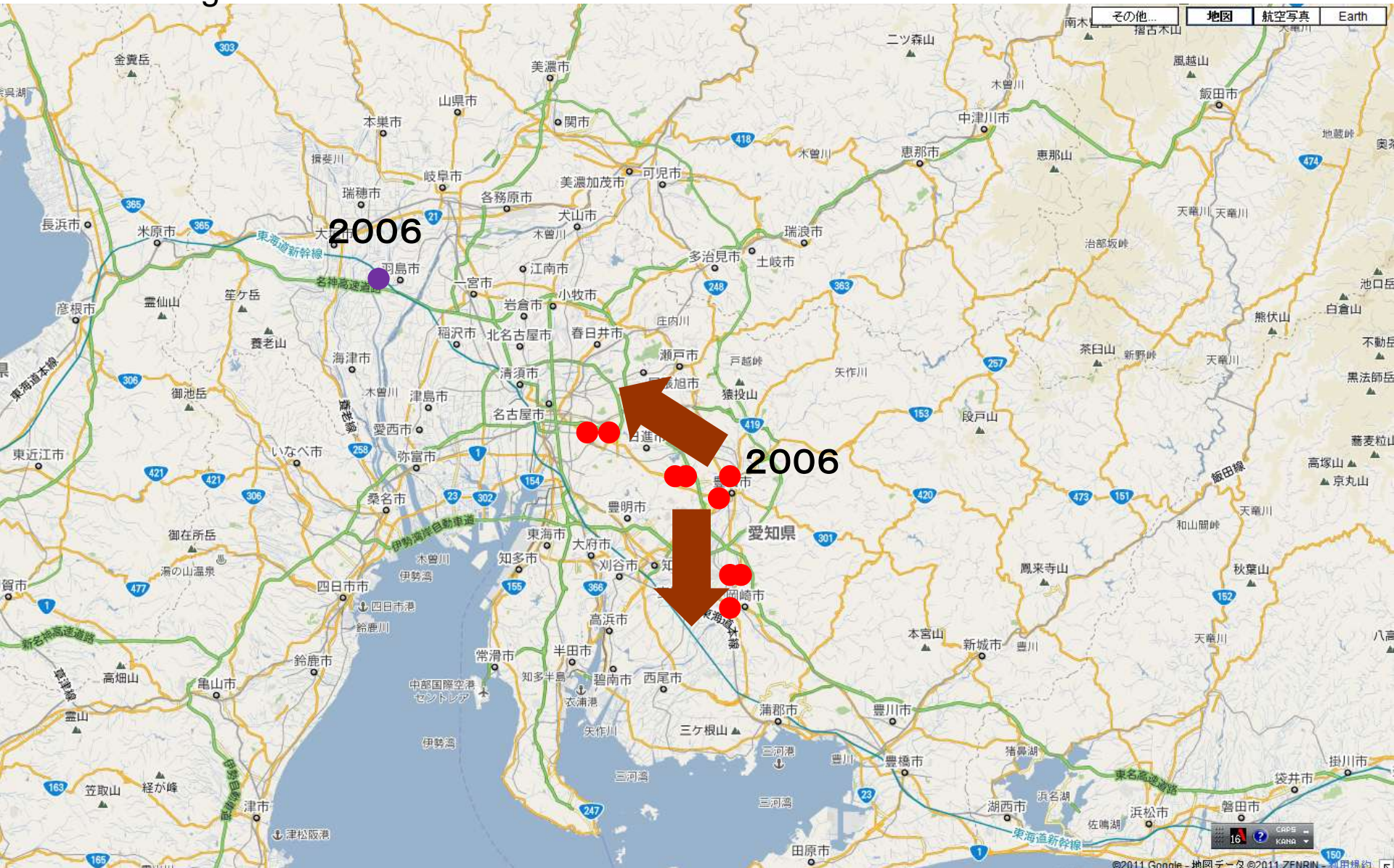


Risks from the mite

- house-dust
 - probably no risk at all
- vectoring diseases
 - probably no risk at all
- genetic contamination with the native mite
 - needs more study
- parasitizing the native carpenter bee
 - needs more study

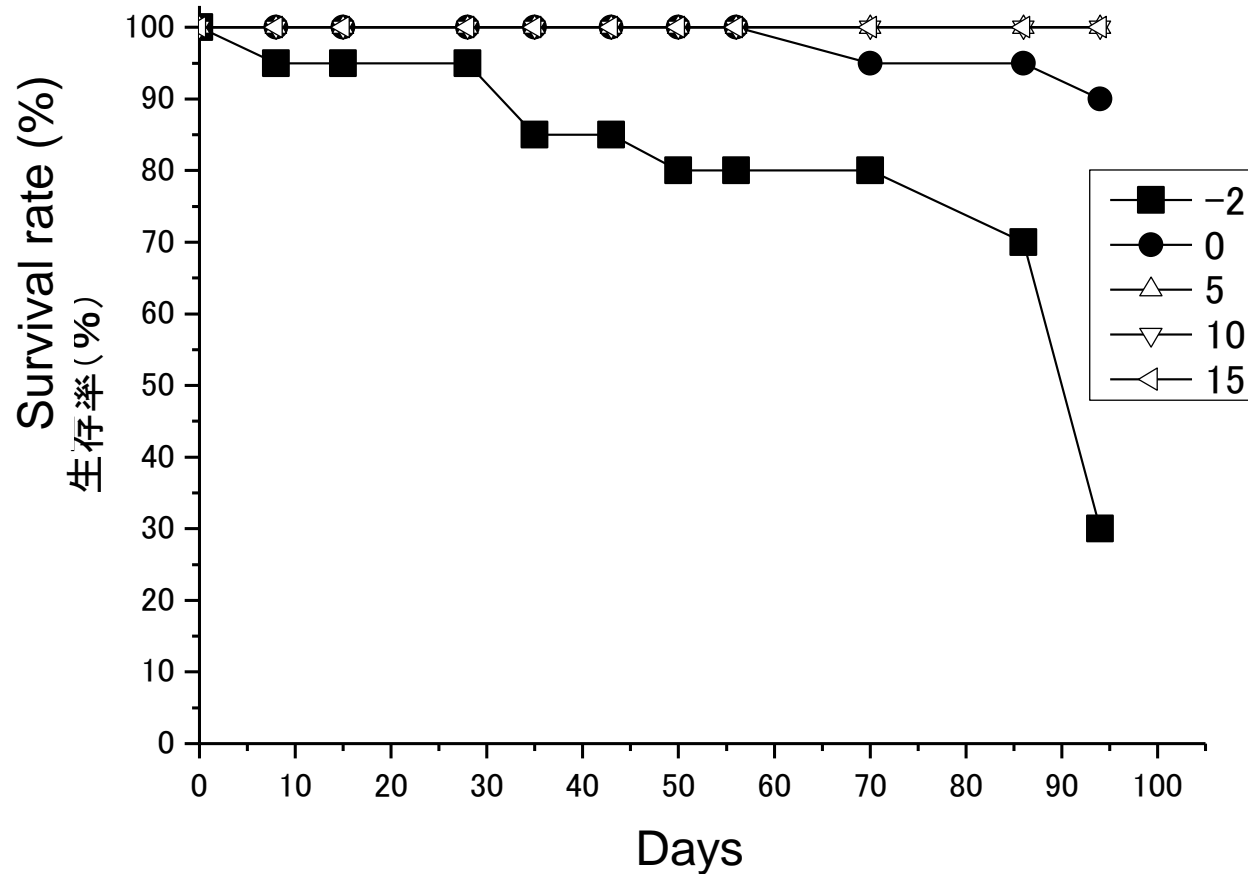
Expansion of distribution of the carpenter bee

During our survey on October 27-28, 2010 at 9 sites, 109 nests including 417 overwintering bees were collected



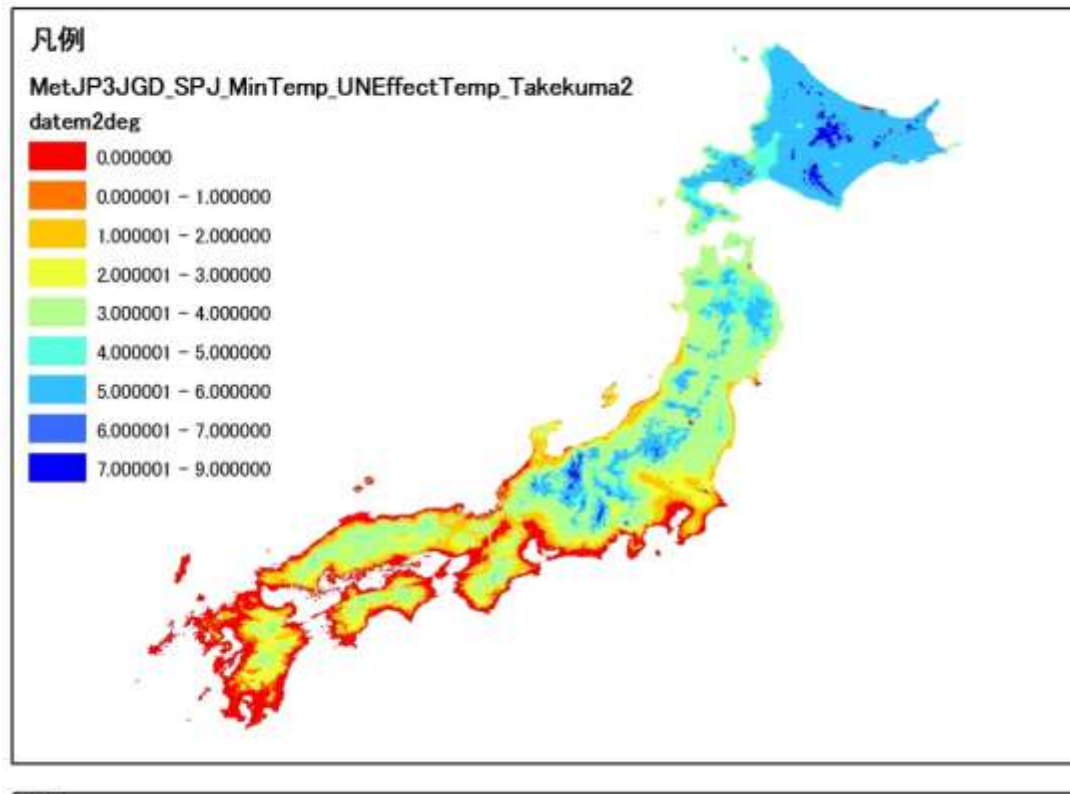
Predicted expansion of distribution within Japan

* Because carpenter bees originated from Tropics, winter temperature should limit the bee distribution



- Under -5°C , bees dies within 24 hrs

The carpenter bee could expand its distribution with the mite to south and central Japan



Average temperature of the coldest month(1km x1 km)

➤ They could survive in the region coloured with red to yellow

* This is almost same as the range of natural bamboo distribution

Conclusions

- *Xylocopa tranquebarorum* established around Nagoya and was originally from mainland China with a symbiotic mite
- So far, risks of the carpenter bee on agriculture, forestry, and human health seem low although it could expand its distribution to the north
- The mite has risks of genetic contamination with the native mite, and maybe parasitizing the native carpenter bee