Working with citizens to monitor tick-associated risk

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Working with citizens to monitor tick-associated risk

Lessons learned from the CiTIQUE project

Jonas Durand, Irene Carravieri, Clémence Leyat, Costanza Puppo, Julien Marchand, Cyril Galley, Sandrine Capizzi, Gwenaël Vourc’h, Marie Préau, Pascale Frey-Klett, Annick Brun-Jacob
Poll questions on stereotypes about ticks

• Do ticks fall from trees to bite you?
  • 1. Yes  2. No  3. It’s better than trees falling on me!

• Should you care about ticks when you’re taking care of your garden?
  • 1. Yes  2. No  3. I can only dream to have a garden

• It’s dangerous to let the mouthparts of the ticks in your skin after removing its body?
  • 1. Yes, because it can still infect you with a pathogen  2. No, because the pathogens are localized in its body  3. Yes, because the body will regrow from the mouth parts
Ticks and tick-borne diseases

• In Europe, ticks are the most important vector for vector-borne diseases for both human and animal health.

• Tick-borne diseases can be caused by bacteria (e.g. Lyme disease), parasites (e.g. babesiosis), viruses (e.g. tick-borne encephalitis).

• There are around 900 different species of ticks in the world, adapted to different ecosystems.
Ticks and citizen science

- Importance of Tick-borne Diseases (TBDs) for public health and society.
  TBDs are a social problem that calls for the implication of citizens.

- Citizen science projects on ticks are increasing in the world.
CiTIQUE: a citizen science program

- Where are the infected ticks?
- What should I do after a tick bite?
- What are the risks associated with a tick bite?
- What is the distribution of tick-borne pathogens?
- Are biting ticks different than questing ticks?

Started in 2017

To improve our knowledge of ticks and tick-borne disease ecology in order to improve prevention
CiTIQUE: How can citizens participate?
Different levels of citizen engagement

**Level 0**
Helping with the outreach of the program
- Adopting good methods to prevent tick bites

**Level 1**
Reporting tick bites
- www.citique.fr
- App Signalement Tique
- Paper form

**Level 2**
Sending biting ticks

**Level 3**
Analyzing the ticks during small internships
- + 50,000 biting ticks stored in the 1st biting tick bank in France
- 19 internships
- 197 students-researchers
- 77 citizen-researchers

**Level 4**
Co-construction of prevention messages with professionals
- + 100 trained professionals
- + 100 partners (Associations, professionals, companies, collectivities...)

Started in 2017

- + 61,000 animal and human tick bite reports
- + 19 internships
Level 1 & 2: results from 2020

18,306 human and 5,300 animal tick bite reports in 2020
Level 1 & 2: Importance of citizens’ contribution

• More than 2000 emails in two years, and 1-2 phone calls per day during peak tick activity.

• Examples of messages:

  Tick probably brought back by my cat who then slept against me.

  The cat brought the tick to the couch and it climbed on the child.
# Level 3: Tous Chercheurs internships

- **Tous Chercheurs = Everyone’s a researcher**
- Tutored by scientists
- Example of a 2-days program:

<table>
<thead>
<tr>
<th>First Day</th>
<th>Second Day</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Discovery and discussion</strong> of the scientific method, ticks and tick-borne pathogens ecology&lt;br&gt;Co-construction of a research question, hypothesis&lt;br&gt;<strong>1st experiment:</strong> morphological identification of ticks</td>
<td><strong>2nd experiment:</strong> PCR on tick DNA to look for <em>Borrelia</em> infection&lt;br&gt;<strong>Analysis and discussion</strong> of the results</td>
</tr>
</tbody>
</table>
Level 3: Tous Chercheurs internships

• Started in 2019
• Are pet-biting ticks representing a risk for human health?
• 19 internships (people from 11 to 73 yo)
• 502 analyzed ticks

Percentage of *Borrelia burgdorferi* sensu lato infected ticks

- Dogs’ ticks
- Cats’ ticks
- Humans’ ticks

- Infected
- Not infected
Level 3: Impact of Tous Chercheurs internships

• Humanities and social science study by Leyat C., Puppo C. and Préau M. (2021)

• Impact on prevention: citizens more aware of the risks, more confident to prevent tick bites and to share their knowledge with others.

• Impact on science representation: renewal of confidence in scientists, new (or confirmed) attraction for science.

• Impact on stereotypes: 3 main stereotypes have been the most cited.
Level 3: Impact of Tous Chercheurs internships

• Impact on stereotypes: Results from the polls

• Ticks do not fall from the trees to bite you

• Ticks can be found in private gardens

• If you left the tick mouth parts in your skin when you remove it, it’s not dangerous as pathogens are contained in its body.
How to make it work?
CiTIQUE: a small team

Julien Marchand
Cyril Galley
and Irene Carravieri

Annick Brun-Jacob
and Sandrine Capizzi
Enseignants-chercheurs

Tom Beyeart

Jonas DURAND

Gwenaël Vourc'h
INRAe

Pascale Frey-Klett
INRAe
CiTIQUE: a multi-actors program focused on research

Improve KNOWLEDGE to PREVENT and REDUCE tick-associated risks

Users:
- National education
- Agricultural education
- Citizens
- Nature and sport professionals
- Forest and agricultural professionals
- Green space planning and management professionals
- Companies with agents subject to risks
- Associations
- Collectivities
- Mutual health insurance
- Companies designing products, equipment, innovative planning practices

Facilitators:
- Associations
- PASTEUR institute
- University Hospital Centers
- National centers of reference
- INRAE
- CNRS
- INSERM

Researchers:
- Nature and sport professionals
- Companies with agents subject to risks
- Associations
- Collectivities
- Mutual health insurance
- Companies designing products, equipment, innovative planning practices

Collaborators:
- PASTEUR institute
- University Hospital Centers
- National centers of reference
- INRAE
- CNRS
- INSERM
Facilitators with different roles

• Linking researchers and users

• Fostering and maintaining engagement in the program

• Program’s ambassadors

• Science communication

• Establishment of structures for participatory research (physical or virtual structures)
Take-home messages

• Interaction with citizens is important: they do not have to only be data providers.

• Proposing different level of engagement for citizens.

• It is possible to make scientist-grade research with citizens in an open lab.

• You cannot do everything alone! Facilitators are important.
Acknowledgements

• All the citizens participating in CiTIQUE
• EWDA Network Meeting organizers
• Our financers:

Thank you for your attention!
Bonus : diapos non utilisées
What is a classical citizen science program

Scientists ask a question → Citizens help as data gatherer → Scientists analyze the data → Scientists find the answer

Contributory citizen science
CiTIQUE: a citizen science program with a participatory approach

Scientists and citizen co-construct a question

Citizens help as data gatherer

Scientists and citizens analyze the data

Scientists and citizens find the answer

Participatory citizen science