Food and Agriculture Organization of the United Nations

International Plant Protection Convention

Department for Environment Food & Rural Affairs

# Six millions of SARS-Cov-2 genomes sequenced…

# How can plant health scientists transfer high throughput sequencing technologies toward plant pest diagnostics ?

**Prof. Sébastien Massart – Liège University – Gembloux AgroBio Tech - Belgium**

London, 21 – 23 September 2022

**International Plant Health Conference**

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Diagnostics for SARS-CoV-2 infections

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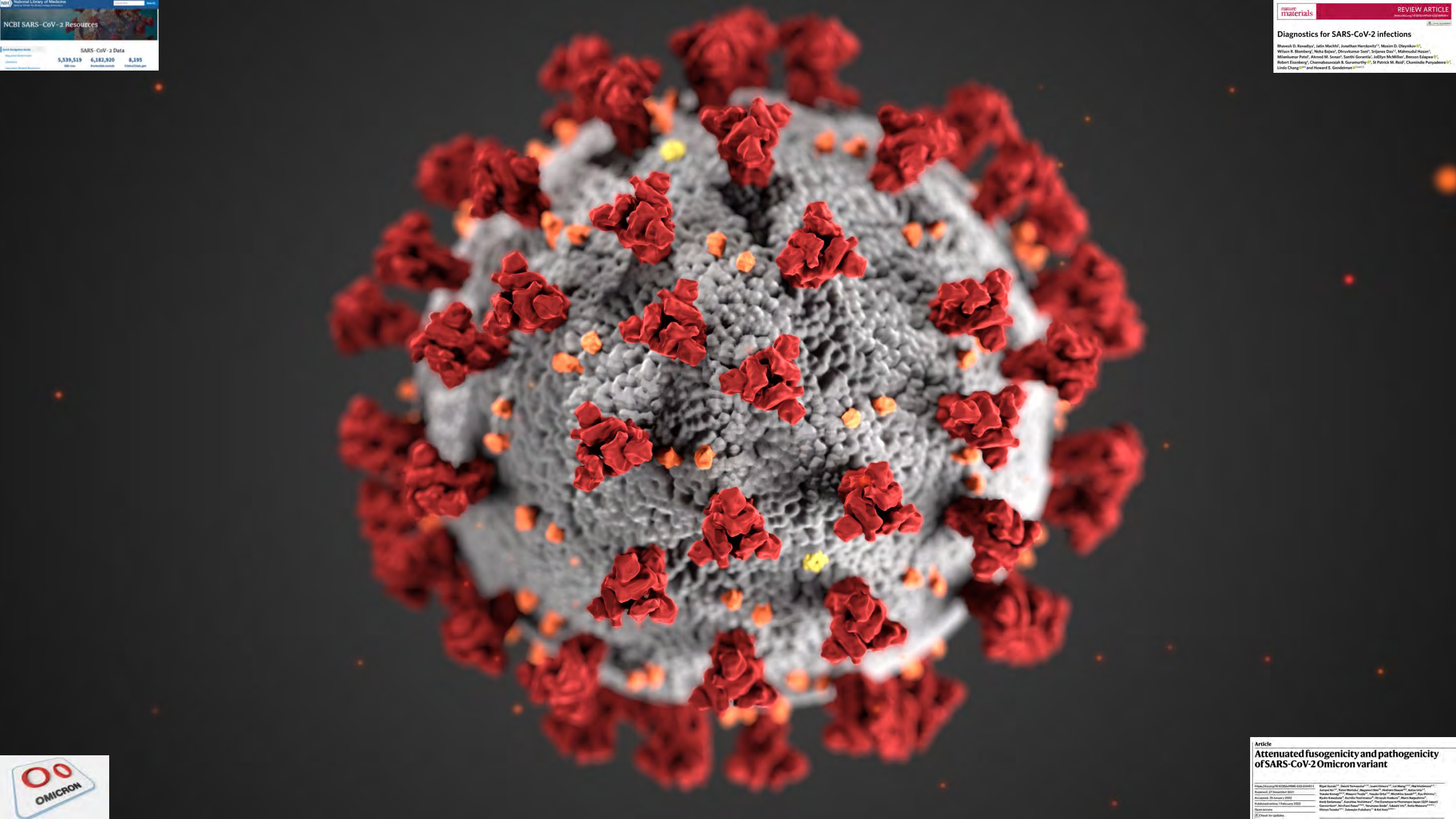





Article

Attenuated fusogenicity and pathogenicity of SARS-CoV-2 Omicron variant

https://doi.org/10.1038/s41586-022-04465-1
Received: 17 December 2021
Accepted: 25 January 2022
Published online: 1 February 2022
Open access
Check for updates

Rigel Suzuki[1,2], Daichi Yamasuba[1,2,3], Izumi Kimura[1,2], Lei Wang[1,2,3], Mai Kishimoto[1,2], Jumpei Ito[1,2], Yuhei Morioka[1], Naganori Nao[1,4], Hesham Nasser[1,2], Keiya Uriu[1,2], Yusuke Kosugi[1,2,3], Masumi Tsuda[1,2], Yusuko Orba[1,2,3], Michihito Sasaki[1,2,3], Ryo Shimizu[1], Ryoko Kawabata[1], Kumiko Yoshimatsu[1], Hiroyuki Asakura[1], Mami Nagashima[1], Kenji Sadamasu[1], Kazuhisa Yoshimura[1], The Genotype to Phenotype Japan (G2P-Japan) Consortium[1], Hirofumi Sawa[1,2,3,4], Yoruman Sinda[5], Sukashi Ito[6], Tetsu Matsuno[1,2,3,4,5,6], Shinya Tanaka[1,2,3], Takasuke Fukuhara[1,2,3] & Kei Sato[1,2,3,4,5,6]

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# NCBI SARS-CoV-2 Resources

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- Sequence Submission
- Literature
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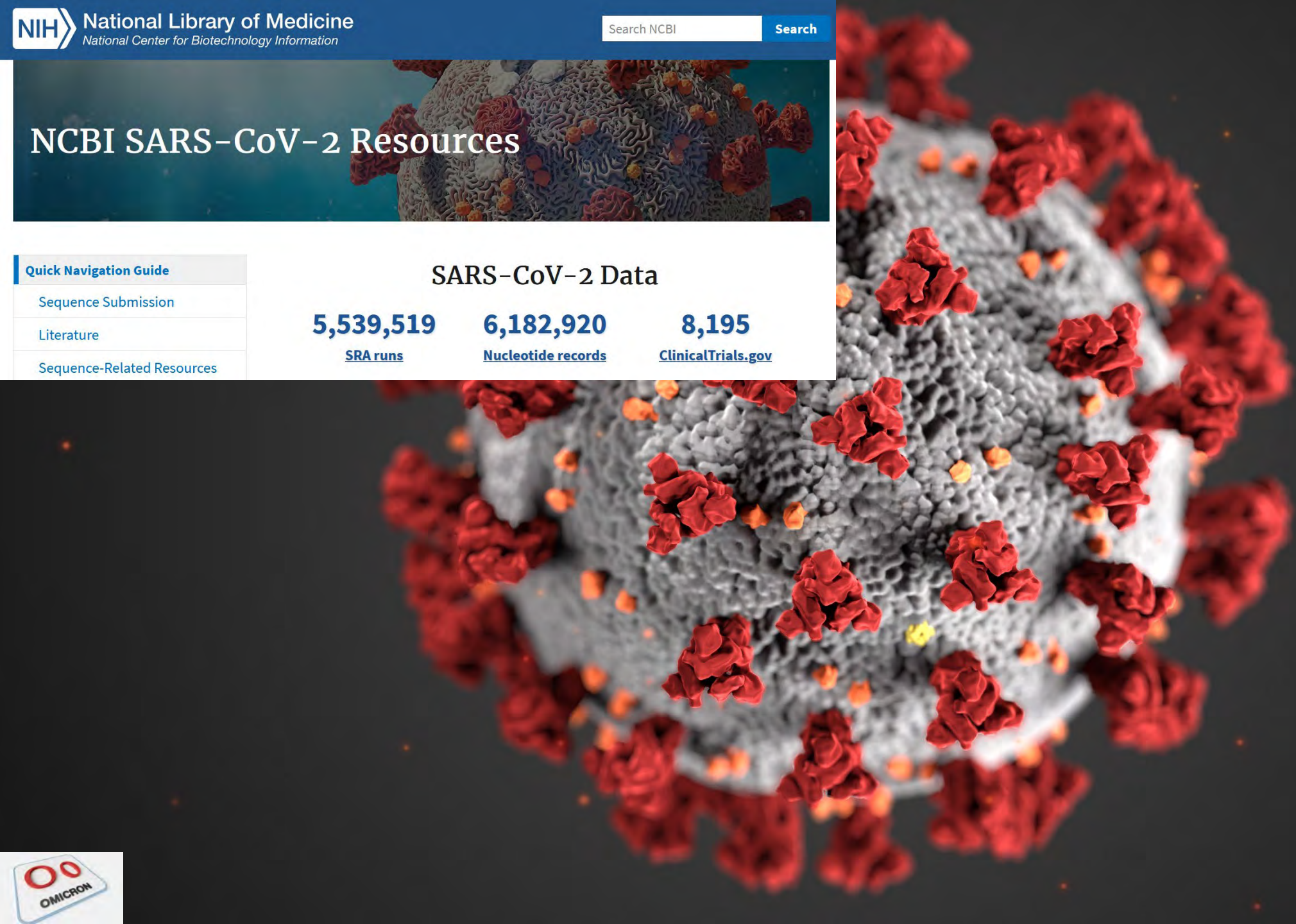
## SARS-CoV-2 Data

| 5,539,519 | 6,182,920 | 8,195 |
|---|---|---|
| SRA runs | Nucleotide records | ClinicalTrials.gov |



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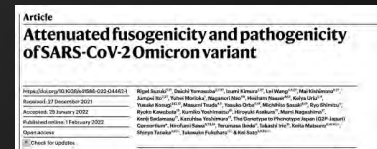
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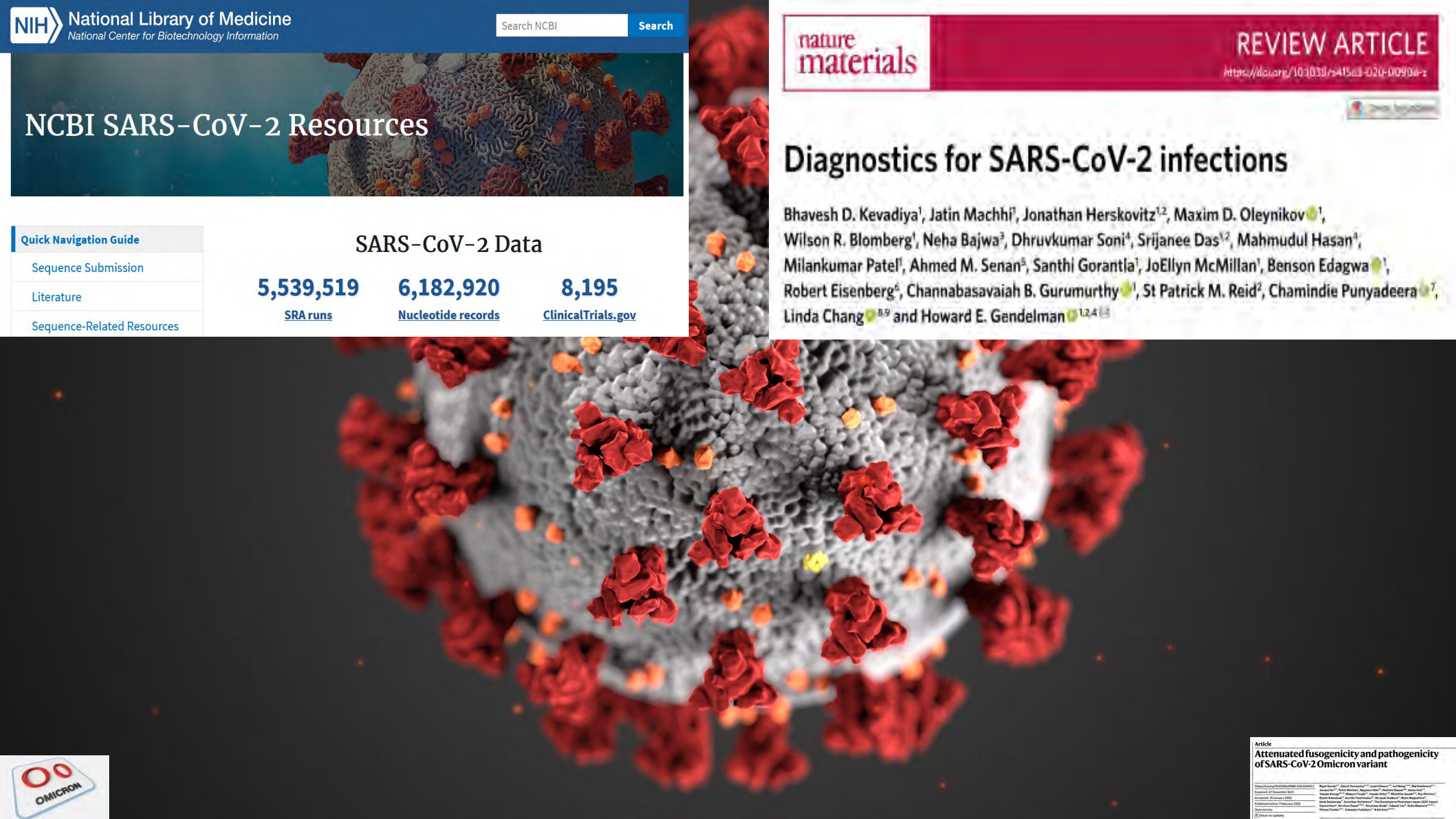

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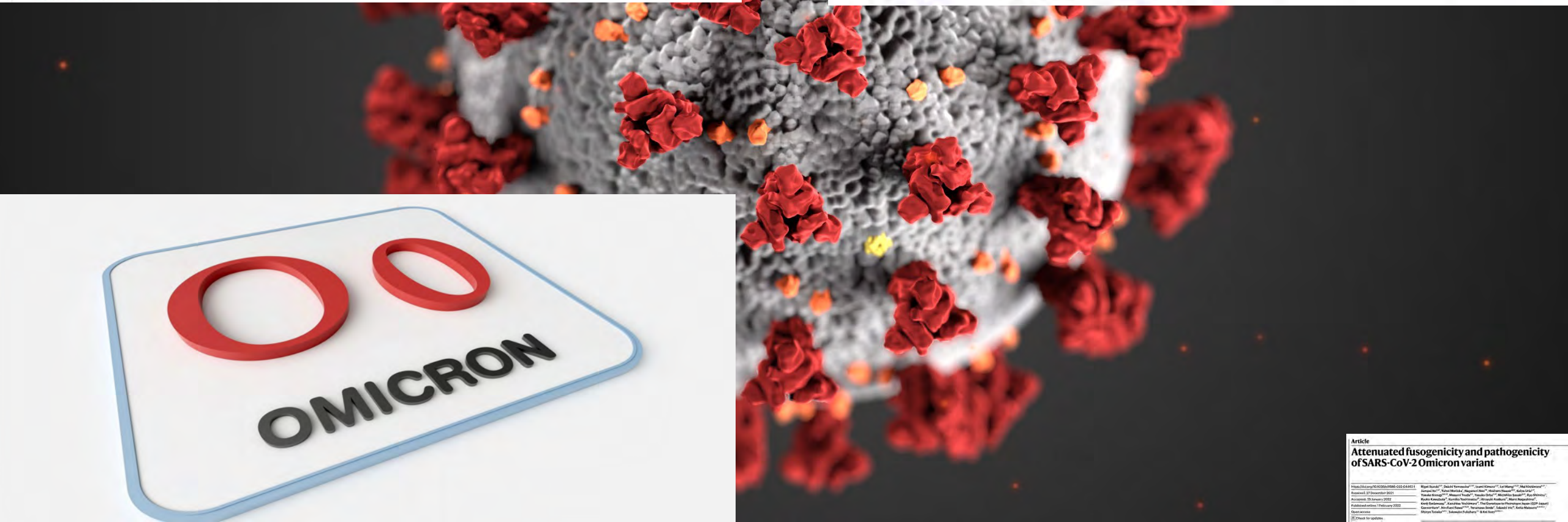


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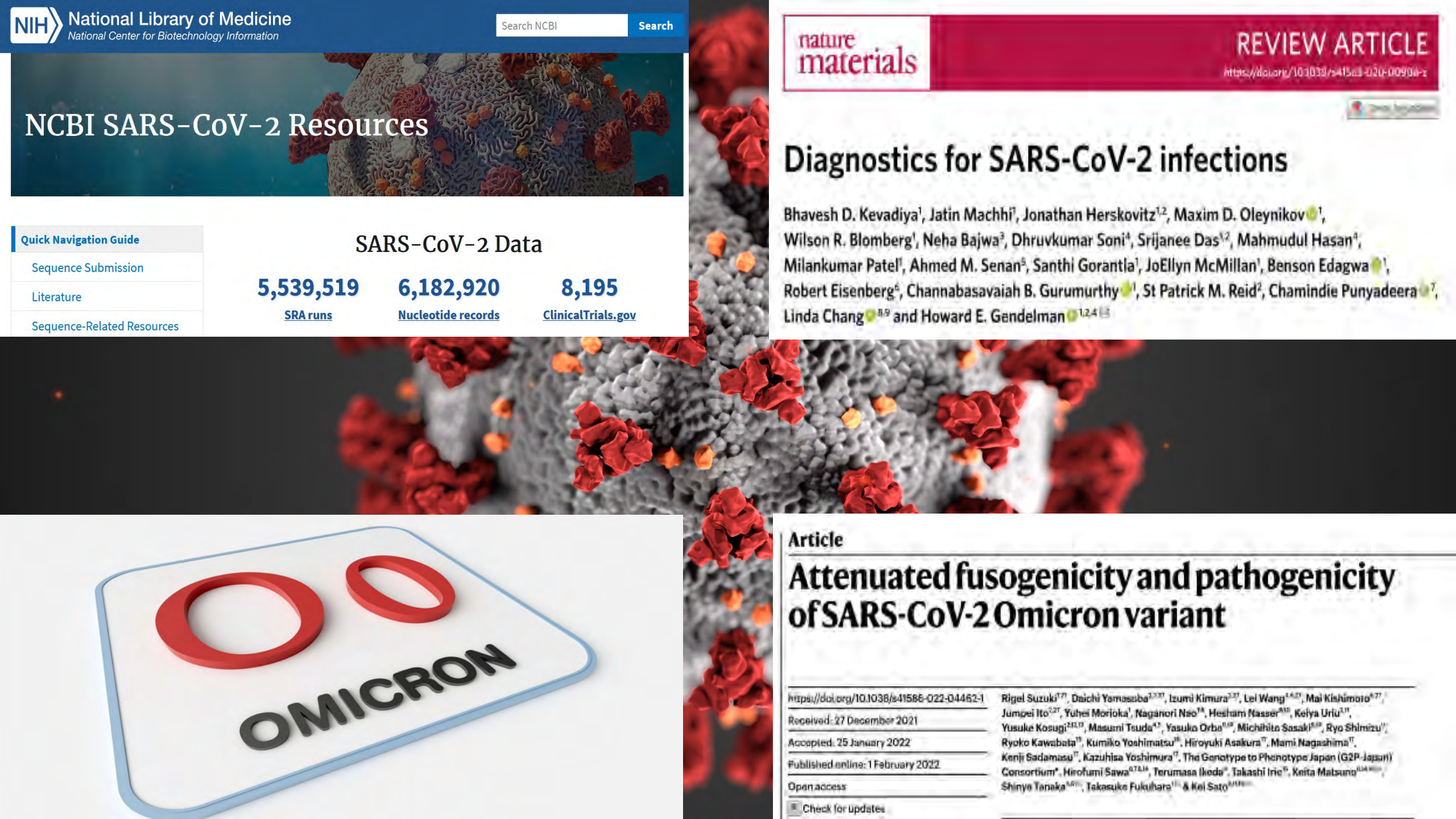
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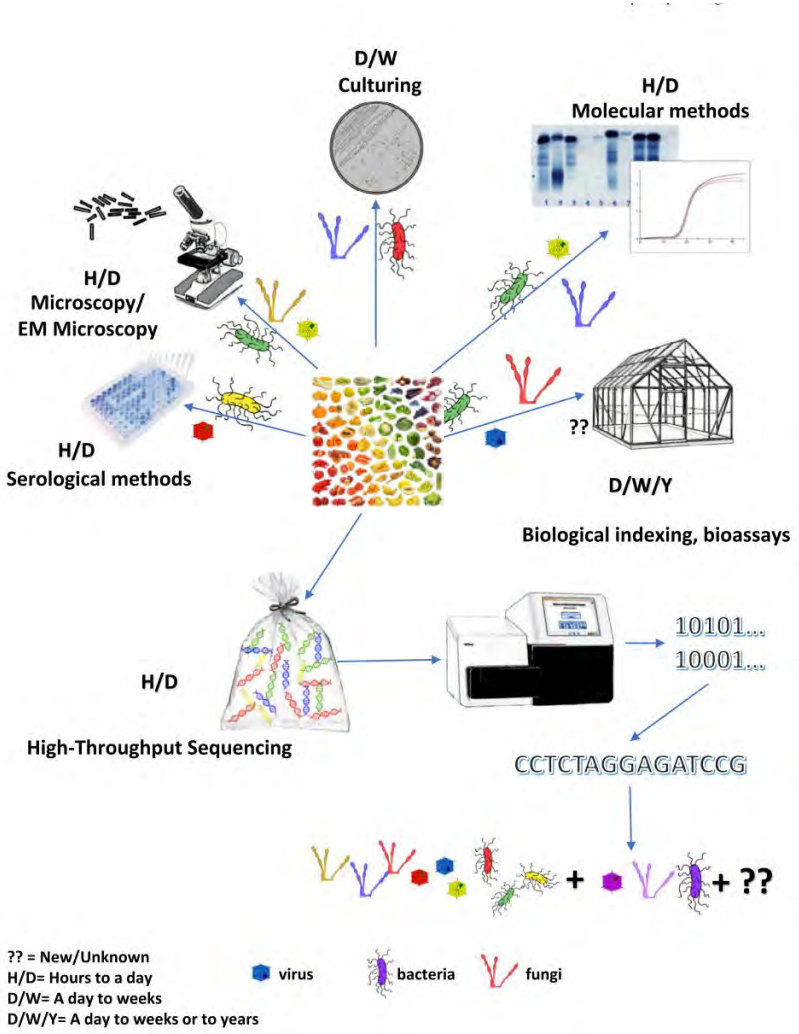
# What about us ?



# What about us ?

What about plant health and its stakeholders ?

**Transfer toward diagnostics :**

Eur J Plant Pathol
https://doi.org/10.1007/s10658-018-1570-0

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SI: PLANT PATHOLOGY FOR INNOVATIVE AGROECOLOGY

**The impact of high throughput sequencing on plant health diagnostics**

Ian P. Adams · Adrian Fox · Neil Boonham · Sébastien Massart · Kris De Jonghe

2018

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**Transfer toward diagnostics :**

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**Transfer toward diagnostics :**

# From research to diagnostics : technical verification or validation

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## Best practices in metabarcoding of fungi: From experimental design to results

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*Article*

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# Writing international guidelines for using HTS to detect plant pests

Valitest

**Guidelines for the selection, development, validation and routine use of high-throughput sequencing analysis in plant diagnostic laboratories**

Coordination: Lebas B., Massart S.

Contributors: Adams I., Al Rwahnih M., Baeyen S., Bilodeau G., Blouin A., Boonham N., Bruinsma M., Candresse T., Chandelier A., De Jonghe K., Fox A., Gentit P., Gaafar Y., Haegemans A., Ho W., Hurtado-Gonzales O., Kutjnak D., Jonkers W., Kreuze J., Landa B., Leite Vicente C., Liefting L., Liu M., Maclot F., Malapi-Wight M., Maree H., Martoni F., Mehle N., Minafra A., Mollov D., Moreira A., Nakhla M., Petter F., Piper A., Ponchart J., Rae R., Remenant JP., Rivera Y., Rodoni B., Roenhorst A., Rollin J., Saldarelli P., Santala J., Souza-Richards R., Spadaro D., Studholme D., Sultmanis S., van der Vlugt R., Tamisier L., Trontin C.Wetzel T., Ziebell H.

*This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N° 773139*

55 co-authors

>1,500 revisions

Any pest

Any technology

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# Writing international guidelines :

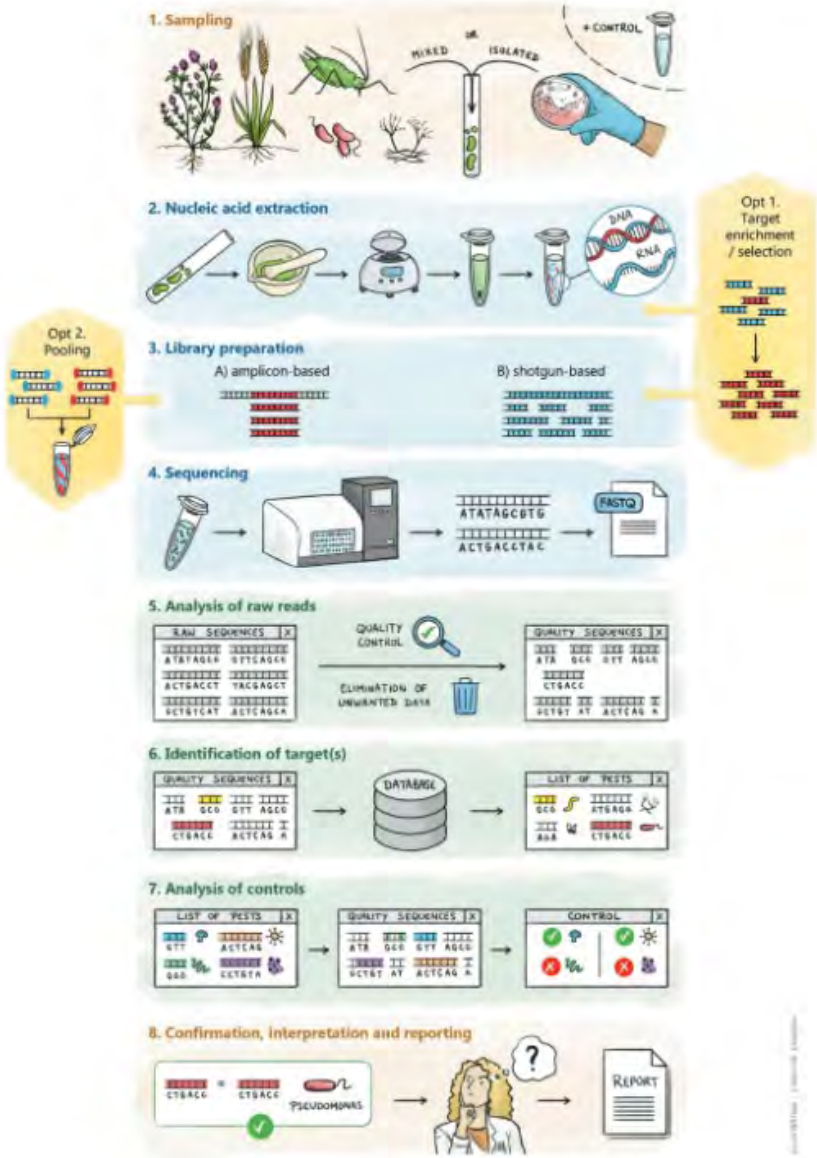
First publication: « building the house »

ORIGINAL ARTICLE | Free Access

## Facilitating the adoption of high-throughput sequencing technologies as a plant pest diagnostic test in laboratories: A step-by-step description

Benedicte Lebas, Ian Adams, Maher Al Rwahnih, Steve Baeyen, Guillaume J. Bilodeau, Arnaud G. Blouin, Neil Boonham, Thierry Candresse, Anne Chandelier, Kris De Jonghe, Adrian Fox, Yahya Z. A. Gaafar, Pascal Gentit, Annelies Haegeman, Wellcome Ho, Oscar Hurtado-Gonzales, Wilfried Jonkers, Jan Kreuze, Denis Kutjnak, Blanca Landa, Mingxin Liu, François Maclot, Martha Malapi-Wight, Hano J. Maree, Francesco Martoni, Natasha Mehle, Angelantonio Minafra, Dimitre Mollov, Adriana Moreira, Mark Nakhla, Françoise Petter, Alexander M. Piper, Julien Ponchart, Robbie Rae, Benoit Remenant, Yazmin Rivera, Brendan Rodoni, Johanna W. Roenhorst, Johan Rollin, Pasquale Saldarelli, Johanna Santala, Rose Souza-Richards, Davide Spadaro, David J. Studholme, Stefanie Sultmanis, René van der Vlugt, Lucie Tamisier, Charlotte Trontin, Ines Vazquez-Iglesias, Claudia S. L. Vicente, Bart T. L. H. Vossenberg, Thierry Wetzel, Heiko Ziebell , Sebastien Massart ... See fewer authors

First published: 08 August 2022 | https://doi.org/10.1111/epp.12863



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# Writing international guidelines :

Second publication: « running the tests»

Peer Community In Infections

RESEARCH ARTICLE

Open Access
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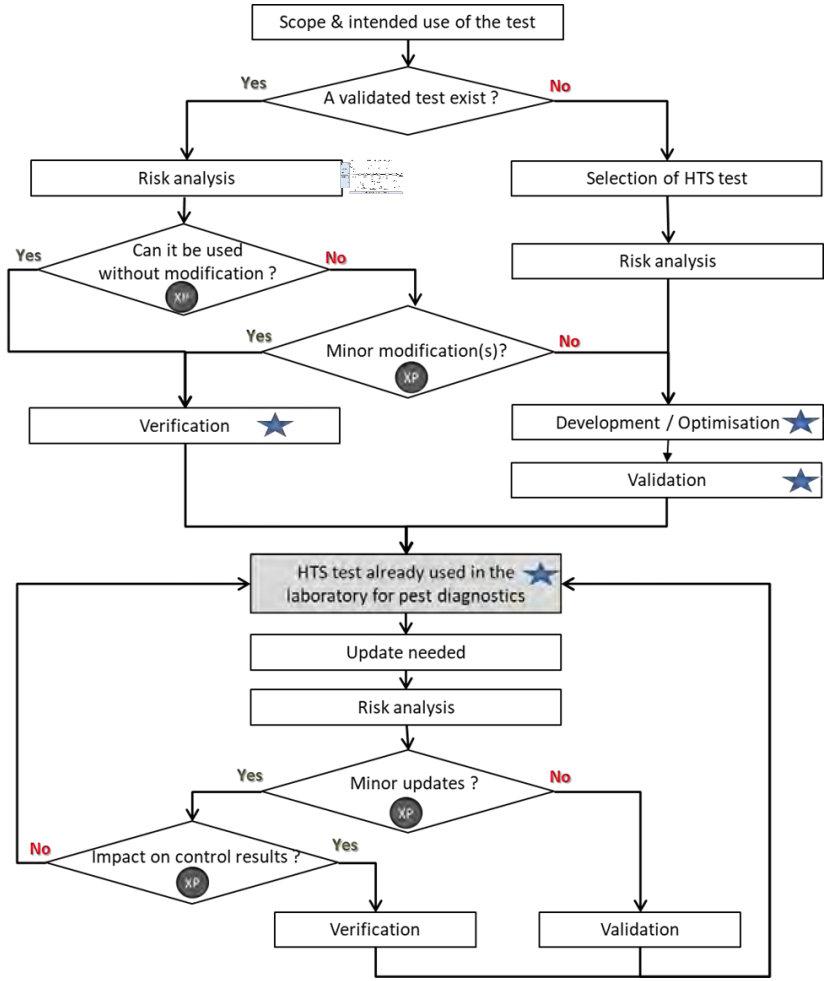
**Guidelines for the reliable use of high throughput sequencing technologies to detect plant pathogens and pests**



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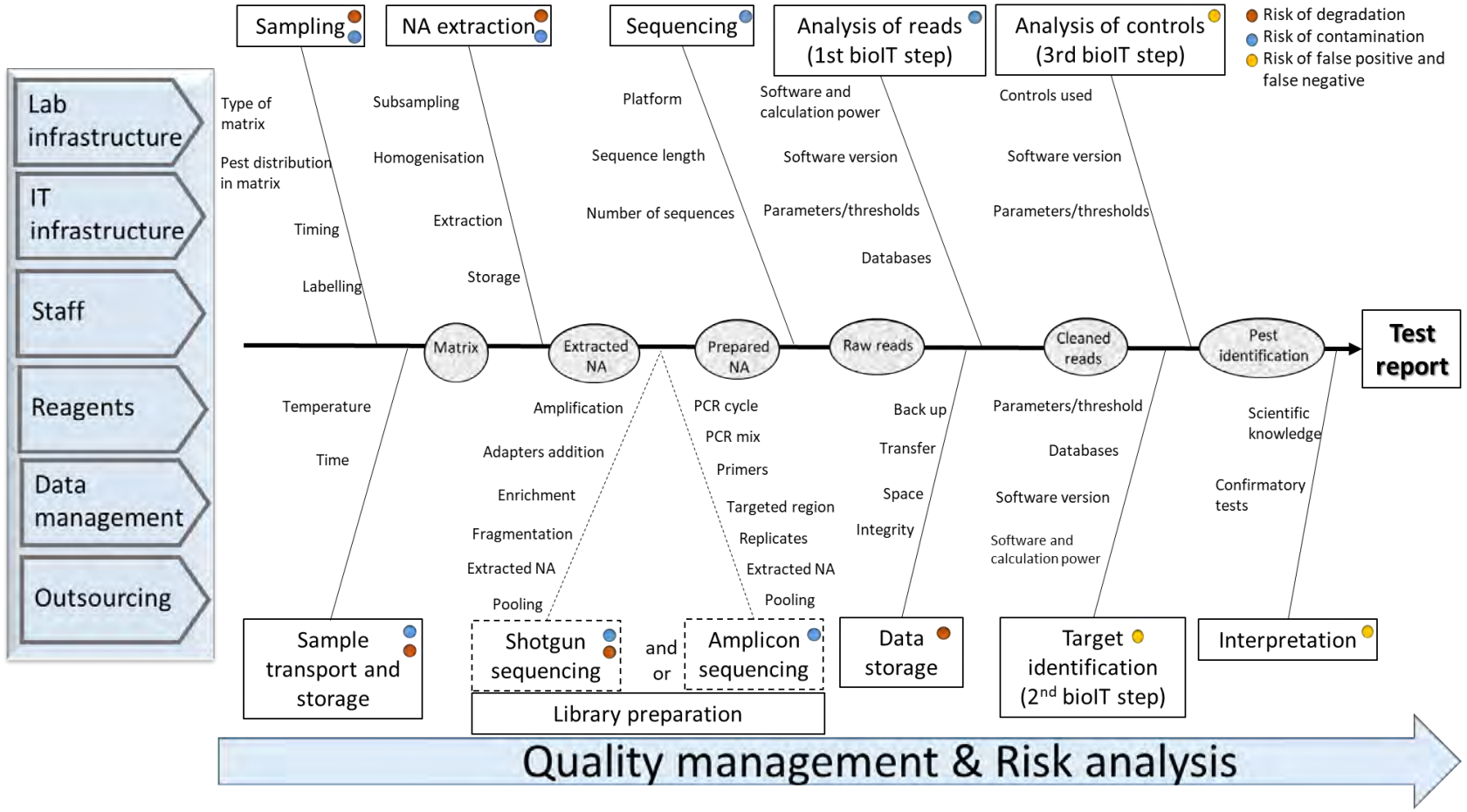

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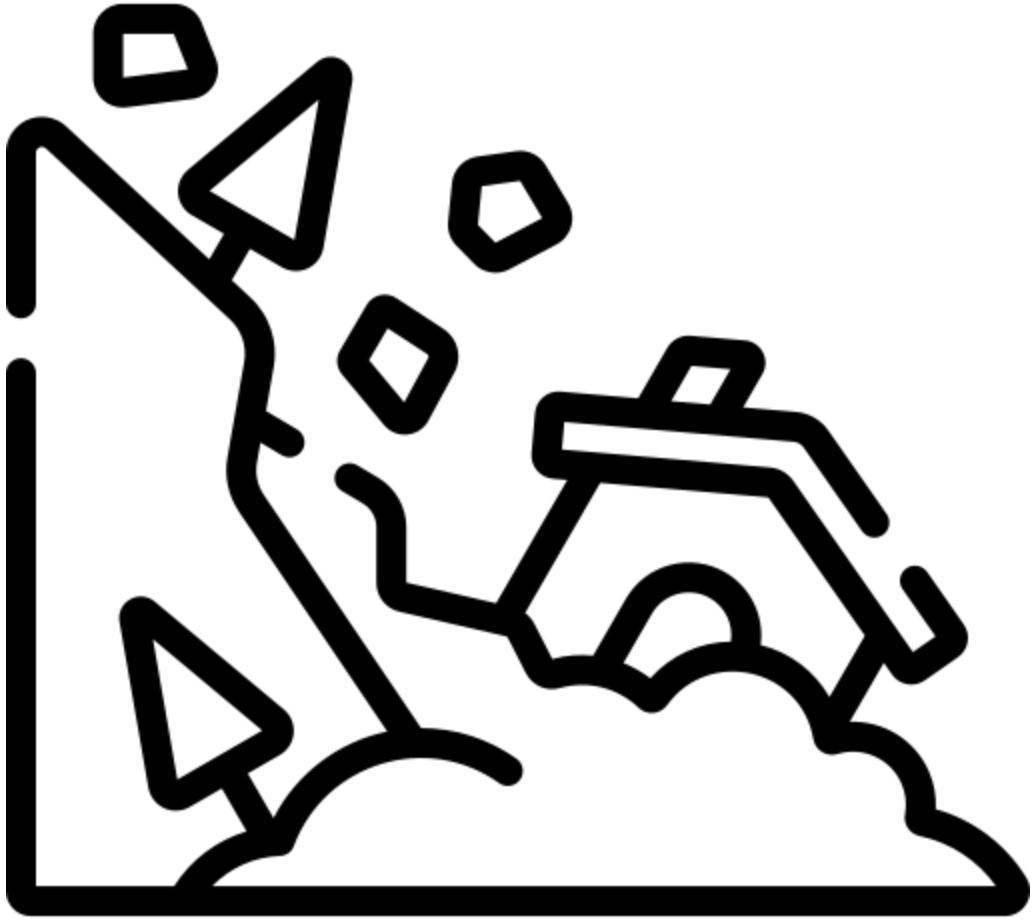
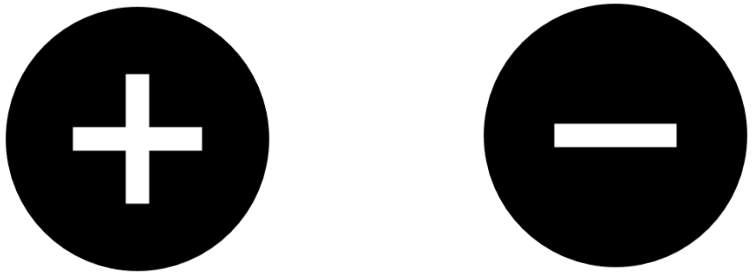


Landslide on external control ?



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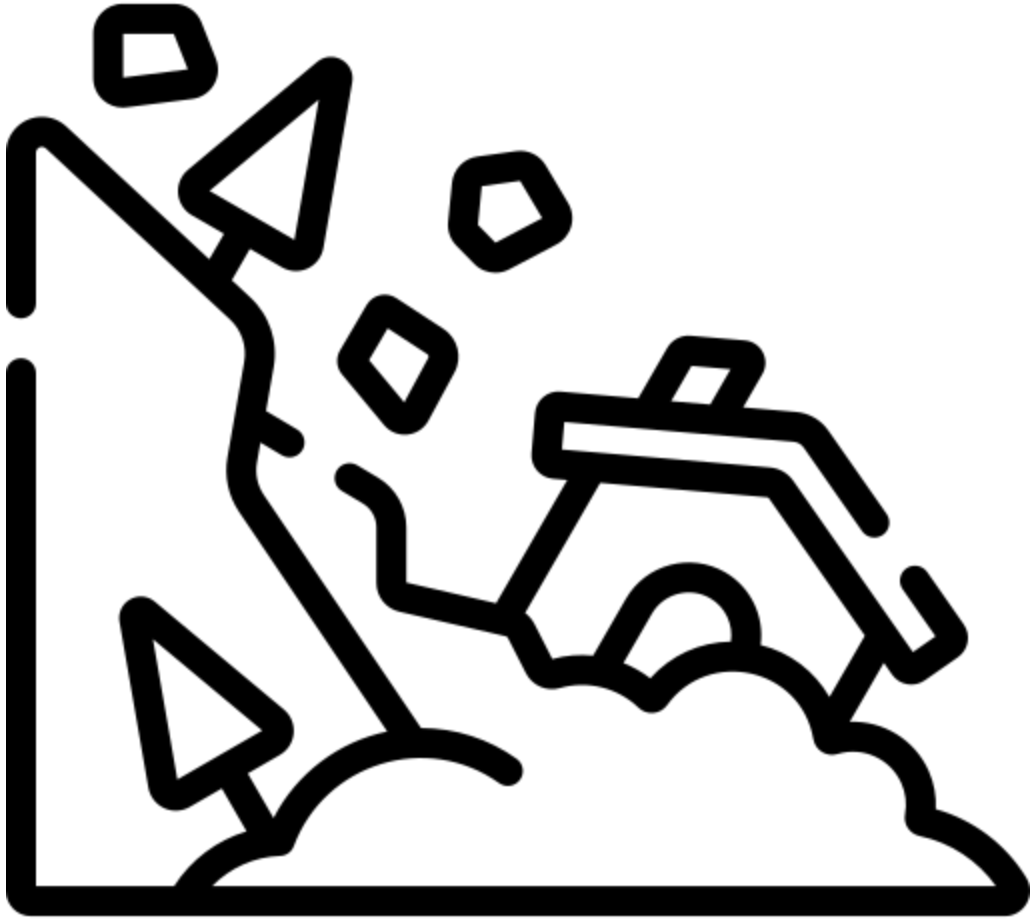
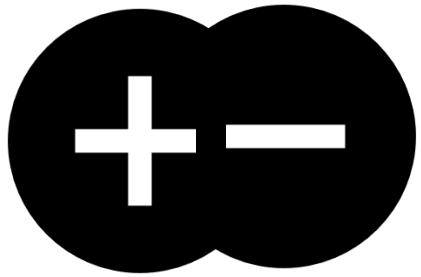


Landslide on external control ?

- Positive control also negative control
- Negative control often useless
- New alien control !



# From guidelines to an official standard :

COUNTRY CONSULTATION – Deadline 2022-05-05

**European and Mediterranean Plant Protection Organization**
**Organisation Européenne et Méditerranéenne pour la Protection des Plantes**

**22-27406**

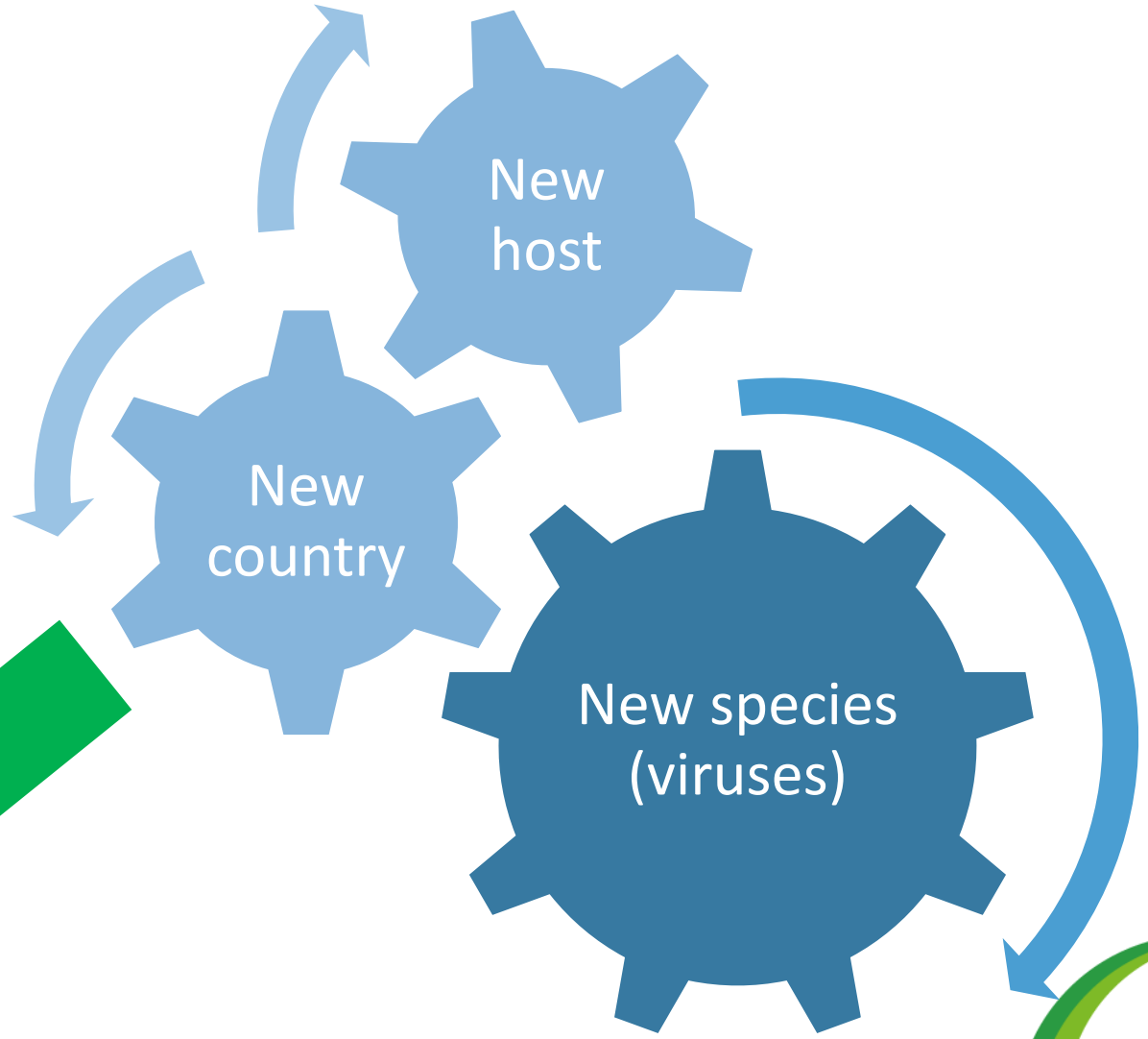
**PM 7/XX**

**Diagnostics**

**PM 7/XX Considerations for the use of High Throughput Sequencing in plant health diagnostics**

# Conclusion & challenges

- From research to diagnostics in plant health
- Guidelines to guide this transition
- ISO17025 accredited HTS tests right now
- Scientific and regulatory challenges :




**How to deal with the information and share the data ?**

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International Plant Protection Convention

Department for Environment Food & Rural Affairs

London, 21 – 23 September 2022

**International Plant Health Conference**

# Thank you for your attention and let's exchange on this !

**Sebastien Massart**
*Professor – Liège University – Gembloux AgroBio Tech -Belgium*

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