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Research articles

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Laurent Hébert-Dufresne, Benjamin M. Althouse, Samuel V. Scarpino and Antoine Allard

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9 January 2020 | Statement | China

. . . and then January 2020 came along.

The NEW ENGLAND JOURNAL of MEDICINE

BRIEF REPORT

A Novel Coronavirus from Patients with Pneumonia in China, 2019

Na Zhu, Ph.D., Dingyu Zhang, M.D., Wenling Wang, Ph.D., Xingwang Li, M.D., Bo Yang, M.S., Jingdong Song, Ph.D., Xiang Zhao, Ph.D., Baoying Huang, Ph.D., Weifeng Shi, Ph.D., Roujian Lu, M.D., Peihua Niu, Ph.D., Faxian Zhan, Ph.D., Xuejun Ma, Ph.D., Dayan Wang, Ph.D., Wenbo Xu, M.D., Guizhen Wu, M.D., George F. Gao, D.Phil., and Wenjie Tan, M.D., Ph.D., for the China Novel Coronavirus Investigating and Research Team

Notes from the Field

A Novel Coronavirus Genome Identified in a Cluster of Pneumonia Cases — Wuhan, China 2019–2020

Wenjie Tan[1,2,#]; Xiang Zhao[1]; Xuejun Ma[1]; Wenling Wang[1]; Peihua Niu[1]; Wenbo Xu[1]; George F. Gao[1]; Guizhen Wu[1,3,#]

COMMENTARY

JOURNAL OF MEDICAL VIROLOGY WILEY

Outbreak of pneumonia of unknown etiology in Wuhan, China: The mystery and the miracle

Hongzhou Lu[1] | Charles W. Stratton[2] | Yi-Wei Tang[3]

statnews.com

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By Helen Branswell Jan. 5, 2020

China pneumonia outbreak: Mystery virus probed in Wuhan

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3 JAN 2020 • BY DENNIS NORMILE

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Thomson Reuters · Posted: Jan 09, 2020 11:27 AM ET / Last Updated: January 9, 2020

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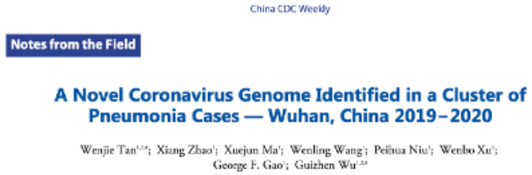
China CDC Weekly

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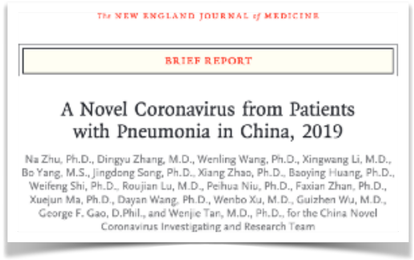
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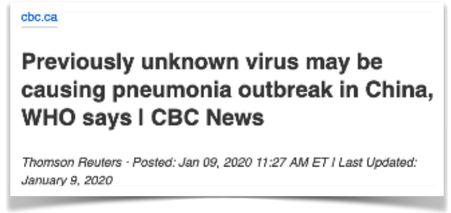
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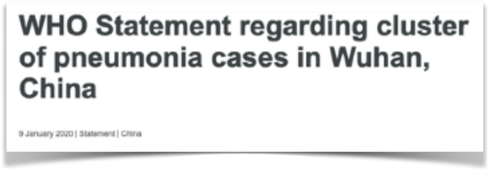
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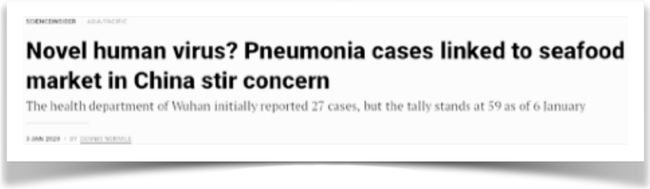
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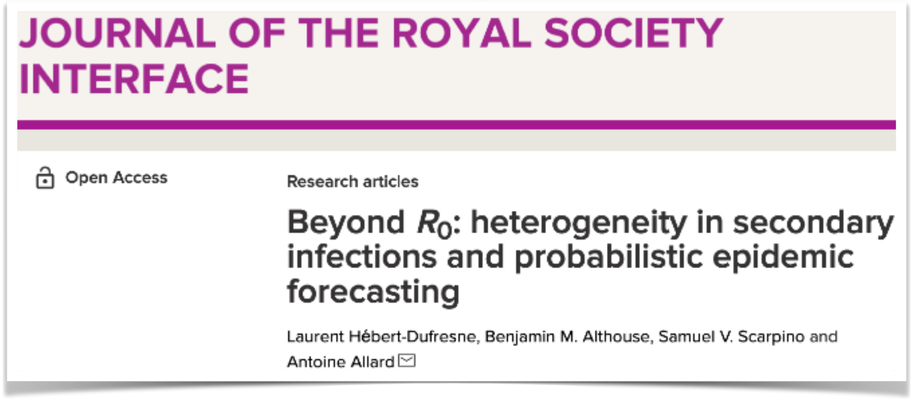
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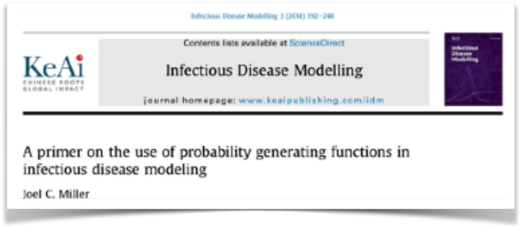
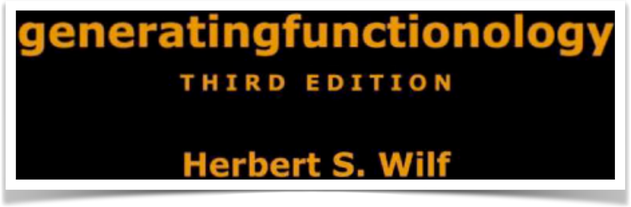
Contact network epidemiology





Probability generating functions (PGFs)

- a PGF is a formal power series whose coefficients are a probability mass function $\{a_n\}_{n\geq 0}$

$$A(x) = \sum_{n\geq 0}^{\infty} a_n x^n = a_0 + a_1 x + a_2 x^2 + a_3 x^3 + \dots$$

- computing the moments

$$A(1) = \sum_{n\geq 0}^{\infty} a_n = 1 \; ; \qquad \langle n \rangle = \sum_{n\geq 0}^{\infty} n\, a_n = \left. \frac{dA(x)}{dx} \right|_{x=1} = A'(1) \; ; \qquad \langle n^p \rangle = \sum_{n\geq 0}^{\infty} n^p\, a_n = \left. \left(x \frac{d}{dx} \right)^p A(x) \right|_{x=1}$$

- extracting the coefficients

$$a_n = \frac{1}{n!} \left. \frac{d^n A(x)}{dx^n} \right|_{x=0} = \frac{1}{2\pi} \int_0^{2\pi} A(\mathrm{e}^{i\theta}) \mathrm{e}^{-in\theta} d\theta$$

- sum of a fix/random number of variables drawn independently

$$B_2^{\mathrm{fix}}(x) = \sum_{l\geq 0} b_l\, x^l = \sum_{l\geq 0} \sum_{n=0}^{l} a_n a_{l-n} x^l = \sum_{n\geq 0}^{\infty} a_n x^n \sum_{m\geq 0}^{\infty} a_m x^m = [A(x)]^2 \; ; \qquad B_p^{\mathrm{fix}}(x) = [A(x)]^p \; ; \qquad C^{\mathrm{rand}}(x) = \sum_{n\geq 0}^{\infty} a_n \big[A(x)\big]^n = A\big(A(x)\big)$$