

1 *Letter to the Editors*

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Cats under the shadow of SARS-CoV-2 pandemic

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13 **Running title:** Cats and SARS-CoV-2

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16 Dear Editor,

17 I have some comments on TBED recently published paper titled “Serological survey
18 of SARS-CoV-2 for experimental, domestic, companion and wild animals excludes
19 intermediate hosts of 35 different species of animals” by Deng JH, et al ([Deng et al.,
20 2020](#)).

21 SARS-CoV-2 has become pandemic and brought unprecedented challenges to the
22 public health ([Ward et al., 2020](#)). The natural reservoir of SARS-CoV-2 were
23 extensively explored by different research groups worldwide and currently remain to
24 be confirmed. In Deng JH’s report, they excluded 35 different species of animals to be
25 the intermediate hosts of SARS-CoV-2 including pet/stray cats (87 samples) and tigers
26 (8 samples) ([Deng et al., 2020](#)). At the same time, another Chinese research group
27 reported that cats not only could infect SARS-CoV-2 and but adolescent cats showed
28 severe histological lesions and died by artificially inoculation of the virus ([Shi et al.,
29 2020](#)). Coincidentally, the third Chinese research group preformed retrospective
30 serological survey on cats during the pandemic in Wuhan, and reported more than 10%
31 serologically positive in 102 cats using ELISA and virus neutralizing antibody tests

32 without mentioning any clinical symptoms of the positive cats ([Zhang et al., 2020](#)).
33 Therefore, we should be very carefully as explaining the disparity of above results and
34 discussing the role cats play in SARS-CoV-2 transmission.

35 First, the SARS-CoV-2 epidemic situations in different sampling cities may
36 contribute to the disparity of above results. Wuhan, the epicentre of SARS-CoV-2
37 epidemics, had more than 50,000 confirmed cases with 5.13% mortality which
38 significantly higher than other cities. Therefore, the cats in Wuhan may more frequently
39 exposed to SARS-CoV-2 contaminated environment when stray cats fed in garbage or
40 pet cats had close contact with their infected owners. In Deng JH's study, they did not
41 mention from which cities or provinces these cats came from.

42 Second, the different types of ELISA were used in two research groups. In Deng JH's
43 research, a commercial SARS-CoV-2 double antigen sandwich ELISA based on virus
44 S1 protein was applied to clinical samples after validating with clear background SARS-
45 CoV-2 negative and positive serum samples ([Deng et al., 2020](#)). Another research group
46 developed a house-made indirect ELISA based on virus receptor binding domain (BRD)
47 protein and set arbitrarily the cut-off as 0.32 of OD₄₅₀ based on 39 SARS-CoV-2
48 negative sera ([Zhang et al., 2020](#)). Later, neutralizing antibodies (>1/20) were detected
49 in 9 out of 15 ELISA positive serum samples. The authors did not explain the disparity
50 between ELISA and neutralizing antibody tests. Interestingly, the owners of 3 cats with
51 higher neutralizing antibody titers (1/360, 1/360, and 1/1080) were confirmed to be
52 SARS-CoV-2 patients.

53 Third, some important information such as age and clinical symptoms of cats when
54 sampling in these two field serosurveys were missing. In the experimental cat infection
55 of SARS-CoV-2, juvenile cats (aged 70 days to 3 months) were more susceptible to the
56 virus and died with severe histological lesions in the nasal and tracheal mucosa
57 epitheliums and lungs ([Shi et al., 2020](#)). However, no clinical symptoms of infected
58 cats were described in their study. Coincidentally, a natural infected cat transmitted by
59 her owner in Belgium represented hard breathing, vomiting, and diarrhea, which has
60 been confirmed to be SARS-CoV-2 positive ([The Brussels Times](#)).

61 Besides cats, one large cat (tiger) was recently reported to be infected with SARS-
62 CoV-2 and showed respiratory symptoms in the zoo of New York (USDA). It was
63 believed the tiger was transmitted by a zoo employee who was actively shedding virus.
64 Although lacking some important information in above mentioned experimental
65 researches, serosurveys, and sporadic case reports, it seems we could reach a conclusion
66 that cats can be infected with SARS-CoV-2 by transmission from human, but the
67 reverse transmission from cats to human remains unknown.

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75 **CONFLICT OF INTEREST**

76 The author declares no conflict of interest relevant to this article.

77 **ETHICAL APPROAL**

78 Not applicable to this comment.

79 **Data Availability Statement**

80 The data that support the findings of this study are available from the corresponding
81 author upon reasonable request.

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83 **REFERNCES**

84 Deng, J., Jin, Y., Liu, Y., Sun, J., Hao, L., Bai, J., ... Tian, K. (2020). Serological survey
85 of SARS-CoV-2 for experimental, domestic, companion and wild animals excludes
86 intermediate hosts of 35 different species of animals. *Transboundary and Emerging*
87 *Diseases*, doi: 10.1111/tbed.13577.

88 The Brussels Times. Coronavirus: Belgian woman infected her cat.
89 <https://www.brusselstimes.com/all-news/belgium-allnews/103003/coronavirus->

90 belgian-woman-infected-her-cat/
91 Shi, J., Wen, Z., Zhong, G., Yang, H., Wang, C., Liu, R., ... Bu, Z. (2020).
92 Susceptibility of ferrets, cats, dogs, and different domestic animals to SARS-
93 coronavirus-2. *Science*. pii: eabb7015. [https://doi: 10.1126/science.abb7015](https://doi.org/10.1126/science.abb7015).
94 USDA Statement on the Confirmation of COVID-19 in a Tiger in New York.
95 [https://www.aphis.usda.gov/aphis/newsroom/news/sa_by_date/sa-2020/ny-zoo-](https://www.aphis.usda.gov/aphis/newsroom/news/sa_by_date/sa-2020/ny-zoo-covid-19)
96 covid-19
97 Ward, M., Li, X., & Tian, K. (2020). Novel coronavirus 2019, an emerging public
98 health emergency. *Transboundary and Emerging Diseases*, 67(2):469-470. [http://doi:](http://doi.org/10.1111/tbed.13509)
99 10.1111/tbed.13509.
100 Zhang, Q., Zhang, H., Huang, K., Yang, Y., Hui, X., Gao, J., ... Jin, M. (2020). SARS-
101 CoV-2 neutralizing serum antibodies in cats: a serological investigation. *BioRxiv*
102 *Preprint*, <https://doi.org/10.1101/2020.04.01.021196>.