

# Editorial for SARS-CoV-2 and COVID-19 Topical Collection

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A previously unknown coronavirus, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), was isolated in Wuhan, China in December 2019, from a patient with a respiratory disease linked to potential contact with wild animals. The emergence of SARS-CoV-2 infection in humans resulted in the coronavirus disease 2019 (COVID-19) pandemic, which has had an alarming case fatality rate and has posed a threat to human health and socioeconomic activity across the world. The multinational efforts to develop vaccines have resulted in several candidates with excellent safety and efficacy profiles, and large-scale vaccination campaigns were implemented early in 2021 to prevent SARS-CoV-2 infections. Likewise, several antivirals have been developed and are currently used in the therapeutic treatment of the SARS-CoV-2 infection.

Since the emergence of SARS-CoV-2, unprecedented massive advances have been made in practically all research areas regarding the biology of SARS-CoV-2 and its associated COVID-19 disease. In this Topical Collection, “SARS-CoV-2 and COVID-19”, we aimed to cover different aspects related to molecular biology, viral replication and transmission, virus–host interactions, viral pathogenesis, virus epidemiology, virus evolution, prophylactic vaccines, therapeutic antivirals, viral detection and diagnostics, and clinical studies in SARS-CoV-2 infection and COVID-19 disease, with the overall goal of providing the latest insights into this important human pathogen and its associated disease. For this Topical Collection, we have assembled a total of 101 manuscripts, including 4 review articles, 5 brief reports, 9 communications, 3 case reports, 1 opinion, 1 perspective, and 78 original research articles.

The first part of this Topical Collection is focused on the molecular biology of SARS-CoV-2. This section is covered by two original manuscripts exploring conformational landscapes and cryptic binding pockets in distinct functional states of the SARS-CoV-2 Omicron BA.1 and BA.2 variants of concern (VoCs) (1) and a second manuscript describing a computational model of the SARS-CoV-2 Spike (S) protein and its implications for the viral membrane fusion mechanism (2).

The second Topic focuses on the recent advances in viral replication and transmission and comprises one case report addressing multiorgan and vascular tropism in SARS-CoV-2 (3) and four original research articles evaluating the different outcomes of the original virus and the B.1.617.2 and B.1.1529 VoCs of SARS-CoV-2 in transgenic K18 hACE mice (4), the spread of COVID-19 at the United States Department of Veterans Affairs during the beginning of the 2019–2020 influenza season (5), the capacity of arthropod ectoparasites to bind SARS-CoV-2 via ACE (6), and the development of a human A549 cell line expressing ACE2 and TMPRSS2 to facilitate the viral infection of SARS-CoV-2, including VoCs (7).

The third Topic in this Topical Collection relates to virus–host interactions and includes one review article describing ACE2-independent alternative receptors for SARS-CoV-2 (8) and three original research manuscripts describing the expression of SARS-CoV-2 entry factors in patients with chronic hepatitis (9), complement activation-independent attenuation of SARS-CoV-2 infection by C1q and C4b-binding proteins (10), and the balance



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of the host cell membrane, receptor, and antibody docking in the SARS-CoV-2 Omicron VoC (11).

The fourth subject area in the Topical Collection addresses SARS-CoV-2 pathogenesis. This section is covered by one review article describing hyperinflammatory responses in COVID-19 (12), a brief report on the association between SARS-CoV-2 viral load and patient symptoms and clinical outcomes using droplet digital PCR (13), and twelve original research articles covering different aspects of the pathogenesis of SARS-CoV-2. These articles include studies on the effect of SARS-CoV-2 infection on vagal activity (14), Epstein–Barr virus and human herpesvirus-6 reactivation in COVID-19 patients (15), the avidity of the receptor-binding domain (RBD) IgG as a prognostic factor (16), the prevalence of acute respiratory distress syndrome (ARDS) in hospitalized patients (17), clinical aspects in asymptomatic, moderate, and severe COVID-19 patients (18,19), COVID-19 infection in pregnancy (20), multiorgan virus dissemination (21,22), the antibody-dependent enhancement of SARS-CoV-2 infection (23), the relationship between cardiovascular-disease-associated immune dysregulation and SARS-CoV-2 infection (24), and an analysis of SARS-CoV-2 infection in domestic and wild animals (25).

The fifth section covers the epidemiology of SARS-CoV-2 and includes four communication articles describing viral shedding among re-positive SARS-CoV-2 individuals in the Republic of Korea (26), the lack of evidence for SARS-CoV-2 spillover in free-living neotropical non-human primates in Brazil (27), the neutralizing activity of serum against the B.1.17, B.1.351, and P.1 SARS-CoV-2 VoCs in hospitalized COVID-19 patients (28), and SARS-CoV-2 re-infection in a healthcare worker despite the presence of neutralizing antibodies (29). This section also includes two case reports describing the first detection of the SARS-CoV-2 B.1.1.7 VoC in an asymptomatic dog in Spain (30) and a genomic surveillance of SARS-CoV-2 in Lebanon (31), and eleven original research articles describing different aspects of the epidemiology of SARS-CoV-2 (32–42).

The next section of the Topical Collection focuses on SARS-CoV-2 evolution and contains two review articles describing the evolution of the SARS-CoV-2 Omicron VoC and the genetic impact on viral fitness (43) and the Spike protein of the new SARS-CoV-2 VoCs (44). This section also includes two brief reports on the genomic and temporal analysis of deletions in the nucleocapsid (N) gene of the SARS-CoV-2 Omicron VoC and their correlation with qRT-PCR dropout (45), and the evolution and immune escape mutations in the S gene present in mild or moderate COVID-19 patients treated with monoclonal antibodies (46). Finally, a total of twelve original research articles are included in this part of the Topical Collection, describing different aspects of the evolution of SARS-CoV-2 (47–58).

The seventh Topic in this Topical Collection is mainly focused on vaccines and vaccination studies. This section includes two communication manuscripts describing the decline in the binding capability of the SARS-CoV-2 Omicron VoC B.1.1.529 RBD to antibodies present in convalescent sera and inactivated vaccine sera early in the COVID-19 pandemic (59) and the T cell responses elicited by COVID-19 vaccines or infection against the SARS-CoV-2 Omicron VoC (60), an opinion letter describing how repeated exposure to sub-infectious doses of SARS-CoV-2 promotes T cell immunity and protection against severe COVID-19 (61), and a perspective on the roles of adjuvants in COVID-19 vaccines (62). This section also contains seven original research manuscripts covering analyses of different adjuvants in SARS-CoV-2 vaccines (63) and different aspects of COVID-19 vaccination (64–69).

The next section focuses on SARS-CoV-2 antivirals and treatments and includes two communications describing the antiviral activity of liposomal lactoferrin against HCoV-229E and SARS-CoV-2 pseudotyped viruses in vitro (70) and the safety and effectiveness of Molnupiravir against SARS-CoV-2 in hemodialyzed patients and kidney transplant recipients (71), and ten original research documents describing different aspects of antiviral research against SARS-CoV-2 in vitro or in validated animal models of viral infection (72–81).

The next section includes one brief report on performance of self-collected saliva testing compared with nasopharyngeal swab testing for the detection of SARS-CoV-2 (82), one

communication describing a new high-throughput nanopore-sequencing strategy for the rapid and automated typing of the SARS-CoV-2 S protein (83), and thirteen original research articles covering different aspects of SARS-CoV-2 detection and/or virus diagnosis (84–96).

The last section of this Topical Collection covers different clinical studies related to SARS-CoV-2 performed in different countries and scenarios. These include a brief report on the burden of pediatric SARS-CoV-2 hospitalizations during the Omicron wave in Germany (97), and four research articles describing the risk factors for the hospitalization of COVID-19 patients in the GENCOV study (98), an analysis of the variability in the clinical course of COVID-19 using a large real-world database (99), a characterization of hematological changes in COVID-19 patients (100), and an analysis of incubation and acute disease stages in mild-to-moderate COVID-19 patients (101).

We hope that the different articles published in this Topical Collection offers readers a comprehensive view of the most recent advances in SARS-CoV-2 and COVID-19 research and stimulates future research, as well as open fruitful collaborations, to increase our current understanding of this important human respiratory pathogen, with the goal of developing more efficient prophylactics and/or therapeutics for the efficient control of SARS-CoV-2 infection and associated COVID-19 disease. We would like to thank all the contributing authors for their time, effort, and participation in this Topical Collection. We would also like to thank the Editorial Office at *Viruses* for all their help, support, and advice in putting together this Topical Collection.

**Conflicts of Interest:** The authors declare no conflicts of interest.

### List of Contributions

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