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Is nCov19 (SARS Cov2/ COVD19) A 3rd world war? A Review: The Pros and Cons in relation with Immunity and LPG (Liberalization, Privatization and Globalization)

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Abstract
All contiguous diseases are infectious, but all infectious diseases are not contagious. Many contagious and zoonotic diseases are posing new challenges to the global scientific community. Year after year these threats are increasing in addition to environmental pollution and antimicrobial resistance (AMR). Presently the globe is under threat of novel coronavirus (nCoV-19) where all the countries are following the physical distance (Not the social distance) to contain the SARS-CoV-2/Human coranavirus19 (HCoV-19) as a preventive measures. Change in the biological cycle of human being and global ecosystem is giving the way to contagious and pollution related mutational changes in the etiological agents. The process of liberalization, privatization and globalization has made the Universe as one consequentially free movement of people and biological material across the globe. The war is visible but, biological war is an invisible war, the nCoV is process of natural selection of large population for its survival which made all the countries to declare silent war (3rd world war). Immunity, food, hygiene and their interrelation ship is also important to contain the present threat. All and above today's urge is global collaboration / Intercontinental / Inter Institutional/ Intersectional approach but not the neocolonial or imperialistic.

Keywords: nCoV-19, SARS-CoV-2, LPG, hygiene, balanced nutrition, zoonoses

1. Introduction
The word "war" is a state of armed conflict between different countries or different groups within a country. War is an organized and often prolonged armed conflict that is carried out by sates and/or non- sate actors - is characterized by extreme violence, social disruption, and economic destruction [1, 2]. The war should be understood as an actual, intentional and widespread armed conflict between political communities, and therefore is defined as a form of "political violence or intervention". Although war may financially benefit a country and stimulate the economy, it has detrimental effects on politics, economics and society. Yet times, the war may change the foreign policies. The war might be a world war [3, 4] or a long run ongoing wars in different countries. It may also be an invisible war like a trade war or it may be a most silent and dreadful bio-war. The American fear of communism led the country into, a state of constant tension and paranoia, the cold war. Hopefully, the nCoV-19 (SARS-CoV-2) is not part of bio-war as per the latest communication published in nature medicine, it has come through natural selection in a large group of population [5].

2. Introduction to Coronaviruses and nCoV-19 (SARS-CoV-2)
Traditionally, viruses were characterized and classified by culture, electron microscopy and serological studies. Coronaviruses were defined as enveloped viruses of 120-160 nm in diameter with a crown-like appearance. The name "coronavirus" is derived from the ***Greek κορώνα,*** meaning crown. Based on their antigenic relationships, coronaviruses were classified into three groups. Group 1 and 2 are composed of mammalian coronaviruses and group 3 avian coronaviruses [6].
Coronaviruses (CoVs) were discovered in the 1960s were classified under family *Coronaviridae* (largest family within the order *Nidovirales)*. Family *Coronaviridae* encompasses two subfamilies: *viz*, *Orthocoronavirinae* and *Torovirinae*. The subfamily *Orthocoronavirinae* includes four genera:

1. Alphacoronavirus, 2. Betacoronavirus, 3.Gammacoronavirus, and 4. Deltacoronavirus [7]. CoVs are typically harbored in mammals and birds and are common in camels, cattle, cats, bats, and other animals. Alpha and betacoronaviruses circulate in mammals, including bats. Gammacoronaviruses mostly infect avian species and a few mammalian species, whereas deltacoronaviruses infect birds and mammals [8]. Animal CoVs are known to cause important diseases in animals and could be responsible for economic losses in domestic animals or birds [8-10]. These animal CoVs include avian infectious bronchitis virus (IBV), transmissible gastroenteritis virus (TGEV), porcine epidemic diarrhea virus (PEDV), and more recently, swine acute diarrhea syndrome-CoV (SADS-CoV). Although rare, animal CoVs have the ability to infect humans and could further spread through human-to-human transmission [11, 12].

The invention of and advances in nucleic acid amplification technologies, automated DNA sequencing and bioinformatics tools in the recent two decades have revolutionized the characterization and classification of all kinds of infectious disease agents. Using molecular methods, coronaviruses are classified as positive-sense, single-stranded RNA viruses [6].

The first discovered CoVs were infectious bronchitis virus (IBV) that causes respiratory disease in chickens and the human CoVs, human CoV-229E (HCoV-229E) and human CoV-OC43 (HCoV-OC43), which cause the common cold in humans [13, 14]. Since the emergence of HCoV-229E and HCoV-OC43, several other HCoVs were also discovered, such as Severe Acute Respiratory Syndrome - CoV (SARS-CoV) in 2002, HCoV-NL63 in 2004, HCoV-HKU1 in 2005, Middle East Respiratory Syndrome - CoV (MERS-CoV) in 2012 [15]. Starting December 2019, there were reports of patients presenting with severe viral pneumonia in the city of Wuhan, China [16]. Sequencing of the virus from these patients has identified a novel CoV as the causative agent of this respiratory disease [16]. The 2019 novel CoV virus (2019-nCoV) was recently named SARS-CoV-2 by the World Health Organization (WHO). The disease caused by SARS-CoV-2 has been named COVID-19. Prior to 2002, CoVs were treated as nuisances but never as serious viruses. Things changed after the emergence of SARS-CoV, which caused serious illnesses and deaths in 2002–2003 [17]. Unlike all human CoVs that cause mild respiratory symptoms, SARS-CoV, MERS-CoV, and SARS-CoV-2 are associated with serious respiratory diseases [17, 18]. Since its emergence, the SARS-CoV-2 has drawn well-deserved attention from the world. Efforts are underway in an attempt to control this new CoV outbreak.

Classification of coronaviruses showed in Table 1.

Table 1: Showing the classification of Coronavirus.

Classification of Corona virus		
Order	Nidovirales	
Family	Coronaviridae	
Sub family	Orthocoronavirinae	Orthocoronavirinae
Genera	Alphacoronavirus: (HCoV-229E,HCoV-NL63,PEDVTGEV and some bat Cov's)	
	Betacoronavirus: (HCov-OC43,HCov-HKU1,MHV,SARS-CoV,SARS CoV2 and Some bats CoVs)	
	Gammacoronavirus: (IBV, Beluga whale (BW)CoVSW1,Ind-Pacific bottle nose Dolphins CoV's)	
	Deltacoronavirus: (Night heron CoV, Wigeon CoV, White Eye CoV, Thrush CoV Bubal Cov and Porcine CoV)	

3. History and Origin of Coronaviruses:

First case of corona virus was notified as "***cold"*** in 1960. As per Canadian study in 2001, approximately 500 patients were identified as Flu-like system, among them 17-18 cases were infected with corona virus strain which were confirmed by polymerase chain reaction (PCR). Until 2002, CoV (Corona virus) cases were treated as simple non-fatal virus. But, in 2003, different reports were published with proofs that the CoV is spreading to many countries such as United States America, Hong Kong, Singapore, Thailand, Vietnam and Taiwan. Subsequently, several (>1000) cases of severe acute respiratory syndrome (SARS) mortalities were also documented in 2003 which was caused by corona (SARS-CoV-1). After a cavernous exercise the scientists understood the pathogenesis of disease and discovered as SARS-CoV-1. In 2004, World health organization (WHO) and centers for disease control and prevention declared a “state emergency”. In Hong Kong 30 patients were confirmed as they were infected with SARS out of 50 patients. In 2012, Saudi Arabian reports were presented several infected patients and case fatalities [19-22]. According to WHO, at the end of November 2019, a total of 2494 laboratory confirmed cases of Middle East Respiratory Syndrome (MERS), including 858 associated deaths (case fatality rate - 34.4%) were reported globally; the majority of these cases were reported from Saudi Arabia (2102 cases, including 780 related deaths with a case fatality rate of 37.1%). The MERS - CoV was transmitted from animal (camels) to people later confirmed as zoonotic virus [23]. At the end of 2019, Wuhan an emerging business hub of China experienced an outbreak of a novel coronavirus infecting over seventy thousand individuals within the first fifty days of the epidemic. The novel virus was named as Wuhan coronavirus or 2019 novel coronavirus (2019-nCoV) by the Chinese researchers. The International Committee on Taxonomy of Viruses (ICTV) named the virus as SARS-CoV-2 and the disease as COVID-19 [24-26].

4. Immunity

The term Immunity refers to the ability of an organism to resist a particular infection or toxin by the action of specific antibodies or sensitized white blood cells. It is the balanced state of multicellular organisms having adequate biological defenses to fight infection, disease, or other unwanted biological invasion, while having adequate tolerance to avoid allergy, and autoimmune diseases. Immunity is broadly classified as Innate and Adaptive; wherein natural and artificial adaptive immunity prevails. Natural might be either passive (maternal origin) or active (infectious origin). Similarly, artificial is also passive (antibody transferred) and active is (through immunization). Innate immunity, on the other hand is naturally present and is not due to prior sensitization to an antigen (infection or vaccination). Since it is not stimulated by specific antigens, innate immunity is generally nonspecific. It is in contrast to acquired immunity, also called natural immunity [27, 28].

5. Food

Food is referred to as any liquid or solid nutritious substance, such as carbohydrates, proteins, and fats, that can be ingested by a living organism and metabolized into energy to build the body tissues. Simply any substance consumed to provide nutritional support for an organism, largely from plant or animal source, and contains essential nutrients like carbohydrates, fats, proteins, vitamins, or minerals is referred to as food [4]. According to Hippocrates "Let thy food be thy medicine and medicine be thy food" [29]. Immunity is a phenomenon which cannot be improved over-night and needs several regular practices like timely intake (prescribed quantity) of balanced diet (which is not possible in the present polluted ecosystem), along with adequate sleep (not possible in the present Global scenario - due to post effects of LPG: Liberalization, Privatization and Globalization), and minimum (20-30 minutes) exposure to direct sunlight.

6. Hygiene

Hygiene is a series of practices performed to preserve health. According to the World Health Organization (WHO), "Hygiene refers to conditions and practices that help to maintain health and prevent the spread of diseases." Personal hygiene refers to maintaining the body's cleanliness. Personal hygiene is partly related to the community, but, environment hygiene is related to the global society, therefore personal hygiene is a part environmental hygiene [30]. Hence, it is necessary to save the globe from agro-industrial pollutants.

7. Interrelationship between food, immunity and hygiene

Immunity is a defense system of the body which is governed by cellular (defense cells) and humoral (antibodies) mediated complex series of actions which an organism cannot build in overnight but requires abundant and balanced nutrition which includes both macro and micro nutrients for their production [31, 32]. Synthesis or manufacturing of such microproteins in the body (inflammatory and anti-inflammatory cytokines, chemokines, proteases, kinases etc.) is important to fight against any pathogens (Bacteria, Viruses, Parasites, Fungi, Rickettesia etc.).

8. How the organism enters into body: Fate of the pathogen in the host cell:

Any disease causing agent(s) may enter through different routes like skin and mucous membrane. The pathogen thus entered will try to create its own soil at the cost of healthy host cells by disturbing its normal function and structure including nucleus [33]. During the process of disease development aforesaid series of defense molecules in the body will come into action, with all essential nutrients that communicate with receptor systems to neutralize, disintegrate, digest and drain the pathogen. In fact all membranous structures of cells (different organs) are fully loaded with antioxidant vitamins, minerals, extra cellular and intracellular elements that play a pivotal role in sub cellular structural injury induced by reactive oxygen species (ROS) and nitric oxide species (NOS) during normal cell functions and also during disease process [27, 33-35].

Hence, balanced diet, adequate sleep, minimum exercise and hygienic practices are important to everyone to lead a healthy life.

9. Changed dynamics in the global society

Changes in basic dynamics in the global society have taken place in consequence to the implementation of Liberalization, Privatization and Globalization (LPG).

The LPG is a new model of economic reforms had influenced the overall economic growth of the different countries in a significant manner and also influenced the social dynamics and demography of India [36, 37].

10. Altered food habits and global scenario

Presently the globe is under a process of repair due to manmade disasters like agro-industrial pollutants and unnatural practices against the nature principles.

There is a biggest threat to the global ecosystem from agro-industrial pollutants. The post effects of LPG are transforming people into nocturnal social beings from diurnal. These activities have exponentially increased from post industrialization and mechanization of agricultural practices. In consequence to LPG, lifestyle diseases like cardiovascular diseases, diabetes, obesity, endocrine disorders etc have become a part of life throughout the Globe. We assume, the persons who are greedy for wealth are more vulnerable to life style diseases. Nocturnal and sedentary workers are being accustomed to consume fast foods than home made. Young children are also customized themselves to eat fast foods. As the result healthy and young people are becoming risk population of life style diseases. In present days rich women are not willing conceive and are practicing surrogacy which is against to the nature's phenomenon. Highly respectable women's WOMB became a market commodity, this could be due to changed global scenario under the umbrella of LPG.

Agro-industrial pollutants (pesticides, fertilizers, fungicides, herbicides, Pb, As, Cr, Cd, etc.,) are contaminating the food. In addition to which the coloring agents, preservatives and other additives are precipitating the contaminants in fast foods / stored foods which are escalating the prolonged type of cell death in the individuals. All these things are influencing the defense system including macro and micro molecules in the body defense organization.

The global society is at a spectacular disparity; for example, a person running for food is different from a person running for digestion of food (Particularly junk food consumers), a women selling her WOMB to another women. At this level of disparity it is difficult to organize them (young person's) to understand the social dynamics of the world, but natural calamities like present scenario will make them to think, to unite, and fight against the challenge to save the globe. Billions of families are under fed, and thousands of families are over fed, millions of families are moderately secured for food, but, all of them are consuming slow poisons regularly which will influence the immune status of individual.

11. Civilization and globalization

Evolution is a continuous process which nobody can stop nor can promote nor can dictate. During the period of documentation of evolutionary theory, Charles Darwin was blamed / questioned by many people. Similarly, during Rudolf Virchow's (son of a butcher) time when he proposed one medicine theory and zoonoses concept due to Trichinella spirals contamination through uncooked pork, he was challenged by distracters (ill thinkers) of the society to eat raw sausage, who later become seriously ill after its consumption. This is the clear documented evidence in the civilized society.

Evolution started from unicellular to multi-cellular organisms and civilization started from apes to different sapiens through the philosophy of "struggle for existence". The present day

man has struggled and survived many wars between different groups of sapiens and is ruling the planet Earth. But the fighting has not stopped or is limited, in fact it has modified into civilian wars (world war I and II) which led to several famines and uncontrolled disease like cancers. This lead to the misbehavior of developed countries (Autocratic, Semi Autocratic, Democratic, Semi Democratic and Imperialistic etc.,) towards under developed and developing Nations under the umbrella of LPG. In addition to this, most of the developed nations are putting their fingers on trigger of nuclear weapons, intercontinental ballistic missiles (ICBMs) and other missiles. On the other hand, some of the nations seem to secretly plan to use dreadful organisms (genetically engineered) as a part of bio-war. There is an invisible trade war between two nations which are influencing the rest of the nation's economy. At this juncture, it is more appropriate to mention Carl Marks quotation that the "economic relations determine all human relations". The present global scenario is giving a grave yard appearance at the cost of economic dominance and posing a challenge to the global scientific community. When would it curtail?

Ecosystem is a typical phenomenon, with independent and interdependent creatures Imbalance in this ecosystem, due to greed economic or socio-political dominance is causing irreparable damage, resulting in emergence of disasters or genetically mutated things, which might be a natures defense mechanism. From global warming, (environmental pollution) [38] to bird flu, Spanish flu -1918-19 (H_1N_1- Pigs); Asian flu - 1957-58 (H_2N_2- Birds); Hong Kong flu - 1968-69 (H_3N_2- Birds) [39]; SARS- 2002 (SARS-CoV-bats); MERS -2012 (MERS- CoV-camel), Ebola, - 1976 & 2014-16(EV), nCoV-19 - 2019-2020 (SARS-CoV-2/ nCoV/ HCoV-19-bats/civet cat?) [40-43] cloud be the result of ecosystem imbalance due to change in humidity, temperature, pH and other factors. These happenings appear true as per the theory of Charles Darwin "The Origin of Species" by means of natural selection (1859) [44].

The globe has become a small village under the influence of LPG, which is against the nature. Over-enthusiasm and over-intelligence of homosapiens is the main reason behind environmental pollution. Present threat is demanding for disintegration of global village (globalization) into isolation and individualization (Ruralization - personal opinion) of small villages including physical distance between the persons, but not the social distance. This is a transformation from technology induced (Mobiles) solitude to threat induced (nCov19 pandemic) solitude.

12. Challenge to scientific community

In spite of much advance in research, the present challenge to contain the nCoV pandemic situation is costing not just the economy of the nation but the life, that could be due to either natural selection of large population group by the nCoV or due to its rapid mutating capacity [5, 40-43]. Good practices are prevailing in rural India than urban India. Humanity and awareness are not connected with education / qualifications, but are connected with social responsibility and human concern which is abundant in rural India and among nongovernmental organizations (NGO's) than the urban India.

13. Conclusion

The spread and containment of present pandemic (COVD19) is mostly in our hands and partly in the hands of governing bodies. Whether, we should invite the situations prevailing in developed countries (Industrialized/Imperialist countries) or not is in our hands (citizens and governments). At this point of time all citizens should act as soldiers to help the health professionals who the real heroes of the episode. The present challenge is a 3rd world war in which all human beings are a part and are fighting with psychological and physiological weapons to defeat the invisible enemy. At the end all of us should learn a lesson to build a model society which respects human beings and ecosystems for long - live of nature's creatures as per the pages printed in "Nature" on November 4, 1869 [45]. At the end it is necessary to remember the Hippocrates thoughts like "As to diseases, make a habit of two things - to help, or at least, to do no harm" and "declare the past, diagnose the present, fore tell the future". Therefore, establishment of Bio-safety level 4 laboratories (BSL -4) at least 4-6 in each country (Particularly under developed and developing countries) is essential to hasten up the process of disease diagnosis and development of suitable vaccines at the earliest possible with inter-institutional and inter-continental collaboration. Involvement of all countries in this process is also essential. Manufacturing of personal protection equipment (PPE) for all health soldiers throughout the Globe is mandatory. All developed countries and United Nations Organization (UNO) should focus on the aforesaid issues with a special concern on under developed and developing countries. International scientific agencies like World Health Organization (WHO), Food and Agricultural Organization (FAO) and World Organization for Animal Health (OIE), International funding agencies like International Monitory Fund (IMF), World Bank (WB) and World Trade Organization (WTO) should work on war foot basis to address the global endemics, pandemics and environmental pollution to establish a humane global society to admire the nature creatures than the imperialistic or colonial societies under "One Health Concept".

14. References

1. American Heritage Dictionary; https://ahdictionary.com/
2. Merriam Webster's Dictionary; https://www.merriam-webster.com/
3. www.history.com; https://www.history.com/
4. www.britanica.com; https://www.britannica.com/
5. www.nature.com/naturemedicine; https://www.nature.com/naturemedicine
6. Woo PC, Huang Y, Lau SK, Yuen KY. Coronavirus genomics and bioinformatics analysis. Viruses. 2010; (2):1804 -1820.
7. Woo PC, Lau SK, Lam CS, Lau CC, Tsang AK, Lau JH *et al*. Discovery of seven novel Mammalian and avian coronaviruses in the genus deltacoronavirus supports bat coronaviruses as the gene source of alphacoronavirus and betacoronavirus and avian coronaviruses as the gene source of gammacoronavirus and deltacoronavirus. Journal of Virology. 2012; (86):3995-4008.
8. Lin CM, Saif LJ, Marthaler D, Wang Q. Evolution, antigenicity and pathogenicity of global porcine epidemic diarrhea virus strains. Virus Research. 2016; (226):20-39.
9. Zhou P, Fan H, Lan T, Yang XL, Shi WF, Zhang W *et al*. Fatal swine acute diarrhoea syndrome caused by an HKU2- related coronavirus of bat origin. Nature. 2018; (556):255-258.
10. Mardani K, Noormohammadi AH, Hooper P, Ignjatovic J, Browning GF. Infectious bronchitis viruses with a

novel genomic organization. Journal of Virology. 2008; (82):2013-2024.
11. Su S, Wong G, Shi W, Liu J, Lai ACK, Zhou J. Epidemiology, Genetic Recombination, and Pathogenesis of Coronaviruses. Trends in Microbiology. 2016; (24):490-502.
12. Forni D, Cagliani R, Clerici M, Sironi M. Molecular Evolution of Human Coronavirus Genomes. Trends in Microbiol. 2017; (25):35-48.
13. Milek J, Blicharz-Domanska K. Coronaviruses in Avian Species- Review with Focus on Epidemiology and Diagnosis in Wild Birds. Journal of Veterinary Research. 2018; (62):249-255.
14. Lim YX, Ng YL, Tam JP, Liu DX. Human Coronaviruses: A Review of Virus- Host Interactions. Diseases. 2016, 4.
15. Van der Hoek L. Human coronaviruses: What do they cause? Antiviral Therapy. 2007; (12):651 - 658.
16. Zhu N, Zhang D, Wang W, Li X, Yang B, Song J, Zhao X *et al*. A Novel Coronavirus from Patients with Pneumonia in China, 2019. New England Journal of Medicine. 2020.
17. Drosten C, Gunther S, Preiser W, van der Werf S, Brodt HR, Becker S *et al*. Identification of a novel coronavirus in patients with severe acute respiratory syndrome. New England Journal of Medicine. 2003; (348):1967-1976.
18. Zaki AM, van Boheemen S, Bestebroer TM, Osterhaus AD, Fouchier RA. Isolation of a novel coronavirus from a man with pneumonia in Saudi Arabia. New England Journal of Medicine. 2012; (367):1814 - 1820.
19. Centers for Disease Control and Prevention (CDC). Update: Outbreak of severe acute respiratory syndrome-worldwide.2003;(MMWR) Morbidity Mortality Weekly Report. 2003; 52(12):241-246.
20. World Health Organization. Coronavirus never before seen in humans is the cause of SARS– update 31. Geneva: The Organization; 2003.
21. World Health Organization. Summary of probable SARS cases with onset of illness from 1 November 2002 to 31 July 2003. http://www.who.int/csr/sars/country/table2004_04_21/en/index.html. Accessed 14 feb 2020.
22. Peiris JS, Lai ST, Poon LL, Guan Y, Yam LY, Lim W *et al*. Coronavirus as a possible cause of severe acute respiratory syndrome. Lancet. 2003; (361):1319 - 25.
23. https://www.who.int/newsroom/fact sheets/detail/middl-e-east-respiratory-syndrome- coronavirus-(mers-cov).
24. Cui J, Li F, Shi ZL. Origin and evolution of pathogenic coronaviruses. Nature Review Microbiology. 2019; 17(3):181-92.
25. Lai CC, Shih TP, Ko WC, Tang HJ, Hsueh PR. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and corona virus disease-2019 (COVID-19): the epidemic and the challenges. International Journal of Antimicrobial Agents. 2020; 105924.
26. Organization WH. Laboratory testing for coronavirus disease 2019 (COVID-19) in suspected human cases: interim guidance, 2 March 2020. World Health Organization, 2020.
27. www.scinecedirect.com; https://www.sciencedirect.com/
28. www.healthline.com; https://www.healthline.com/
29. www.goodreads.com; https://www.goodreads.com/
30. www.health.gov.au; https://www.health.gov.au/
31. www.bmbtrj.org http://www.bmbtrj.org/
32. www.foodprocessing.com; https://www.foodprocessing.com/
33. www.ncbi.nlm.nih.gov; https://www.ncbi.nlm.nih.gov/
34. www.nature.com; https://www.nature.com/
35. www.researchgate.com; https://www.researchgate.net/
36. shodhganga.inflibnet.ac.in; https://sg.inflibnet.ac.in/
37. Pintu Singh.N.Dynamics of Gandhi Model Development in the era of Liberalization, Privatization and Globalization. International Journal of Science and Engineering . Applications.2019; 8(6):146-150.
38. www.nasa.gov; https://www.nasa.gov/
39. Lakshman. M. Foul Play of Flu in Fowls. A.P. Veterinarian. 2004; Oct-Dec issue. 1-10.
40. www. who.int>ith>disease>sars; https://www.who.int/ith/diseases/sars/en/
41. cdc.gov/vhf/ebola/index; https://www.cdc.gov/vhf/ebola/index
42. https://www.nature.com/articles/s41564-020-0695-z https://doi.org/10.1038/s41564-020-0695-z; 02 March 2020
43. https;//bedford.io/blog/ncov/ncov-cryptic.transmission/;https://bedford.io/blog/ncov-cryptic-transmission/2 Mar 2020 by Trevor Bedford
44. https://www.britannica.com/biography/Charles-Darwin/On-the-Origin-of-Species Library of Congress, Washington, D.C. (digital file no. 3b16392)
45. https://commons.wikimedia.org/wiki/File.nature_cover_November_4_1869jpg
46. commons.wikimedia.org/wiki/File.nature_cover_November_4_1869jpg