



## The Alphabet of the Elementary Microbiology: Revisited

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Organizations across the Globe support The Right to Education programs [1, 2]. The best stage to start learning is childhood. Child populations in the age groups 0–4 and 5–11 constitute around 46% of the children under 18 [3]. Approximately 1 billion children attend school on any given day around the world [2]. The urge to learn is a slow process. However, the scenario seems to have changed dramatically since the beginning of the Covid pandemic. The desire to learn has never been greater than that

recorded in the case of Corona. Scientists, medical practitioners, and officials of WHO, Governments, Health Departments have been responding rapidly to learn more and advise the public. There has been a global agreement to share information on Covid-19 and “Whoever finds the Vaccine must share it” [4]. It may not be an over-exaggeration to state all school kids have learned that C stands for Corona. Teaching Microbiology and Biotechnology in schools and colleges has been initiated [5]. Keeping in

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view the need to teach Microbiology at the School and College levels, we propose the Alphabet of The Elementary Microbiology (Table 1).

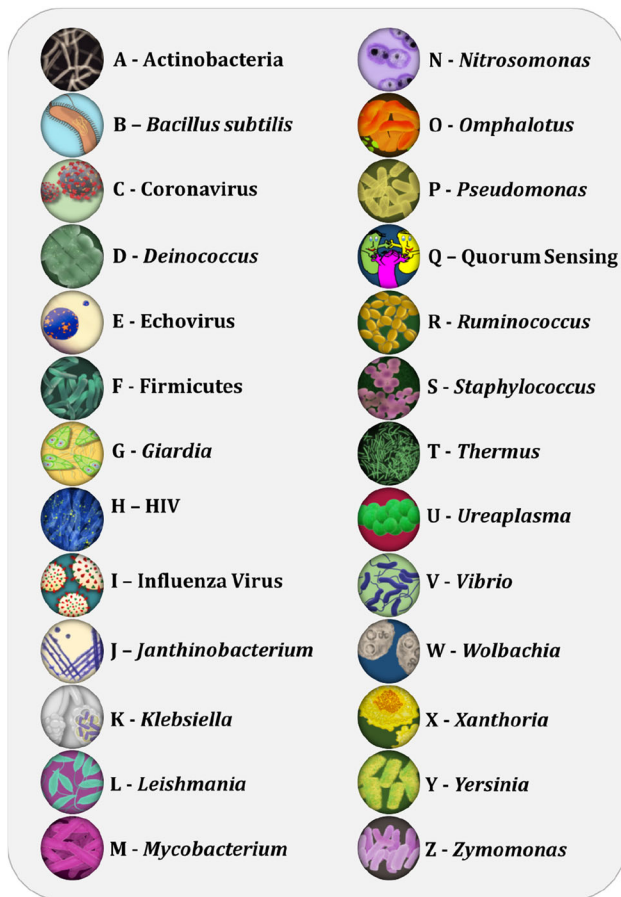
Despite 3.8 billion years since the origin of life and the ubiquitous nature of microbes, the general perception of the population towards the pervasive impact of this microbial diversity remains blurred. The role of microbes in the sustenance of the biosphere is well known. The time is ripe

to popularize these among the population at large. The education system at the elementary school level is the best entry point for disseminating this information and the underlying concepts. Igniting young minds with this magical world of microbes can go a long way in generating awareness among society. Figure 1 provides a glimpse of the diversity of microbial landscape for promoting Microbial Literacy among children. And a detailed description

**Table 1** The alphabet of the elementary microbiology

Alphabet	Microbe			Reference
	Scientific name	Taxonomic category	Applications	
A	<i>Amycolatopsis</i>	Actinobacteria	Antibiotic and anti-inflammatory agent	[6]
B	<i>Bacillus</i>	Firmicutes	Biofuel, Biopolymers	[7, 8]
C	<i>Corona</i>	Virus	Severe acute respiratory syndrome coronavirus (SARS-CoV-2)	[9, 10]
D	<i>Deinococcus</i>	Deinococcus-Thermus	Highly resistant to X-rays	[11]
E	<i>Enterobacter</i>	$\gamma$ -proteobacteria	Biofuel, Infectious diseases	[11]
F	<i>Flavobacterium</i>	Bacteroidetes	Spoilage of food products	[11]
G	<i>Geobacillus</i>	Firmicutes	Enzymes for White biotechnology: lipases, pullulanase, $\alpha$ - and $\beta$ -glucosidase, glycoside hydrolase	[12]
H	<i>Helicobacter</i>	$\epsilon$ -proteobacteria	Pathogen to human beings	[13]
I	<i>Idiomarina</i>	$\gamma$ -proteobacteria	Exopolysaccharide for improving texture of food	[11]
J	<i>Janibacter</i>	Firmicutes	Human infections	[11]
K	<i>Kocuria</i>	Actinobacteria	Ability to grow in Mars-like conditions	[11]
L	<i>Lactobacillus</i>	Firmicutes	Probiotics, health promoter	[14]
M	<i>Mycobacterium</i>	Actinobacteria	Pathogen causing tuberculosis	[15]
N	<i>Nocardia</i>	Actinobacteria	Bioactive molecule: Immunosuppressive, antibacterial	[16]
O	<i>Oceanibaculum</i>	$\alpha$ -proteobacteria	Persistent organic matter degrader	[11]
P	<i>Pseudomonas</i>	$\gamma$ -proteobacteria	Infects plants and animals, plant growth promoter	[17]
R	<i>Paenibacillus</i>	Firmicutes	Produces 2,3-butanediol, exopolysaccharides, cytokinin, antibiotics, fixes nitrogen, plant growth promoter, solubilizes phosphorus in soil	[18]
S	<i>Streptococcus</i>	Firmicutes	Throat and blood infections	[19]
T	<i>Thermus</i>	Deinococcus-Thermus	Diverse molecular biology techniques	[20]
U	<i>Ureaplasma</i>	Tenericutes	Causes urethritis and infect chorionic villi tissues	[21]
V	<i>Vibrio</i>	$\gamma$ -proteobacteria	Pathogen causing cholera	[22]
W	<i>Winogradskyella</i>	Bacteroidetes	Insights into the role of proteorhodopsin-mediated phototrophy	[11]
X	<i>Xanthomarina</i>	Bacteroidetes	$\beta$ -Galactosidase activity	[11]
Y	<i>Yersinia</i>	$\gamma$ -proteobacteria	Pathogen contaminating water, food, and blood transfusions	[23]
Z	<i>Zooshikella</i>	$\gamma$ -proteobacteria	Production of pigments: Prodigiosin and cycloprodigiosin	[11]

Q: Names of bacteria or fungi initializing with Q could not be traced in the literature available in the public domain



**Fig. 1** The Alphabet of Microbiology for the Grown-ups

has been given as supplementary material: A Glimpse into the Magical World of Microorganisms (Figure S1). This initiative is the beginning of a New Era for reinforcing the alphabet of microbiology in society and ignite awareness for a sustainable future.

**Supplementary Information** The online version contains supplementary material available at <https://doi.org/10.1007/s12088-021-00987-7>.

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