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Short communication

The mining of cobalt must meet the highest environmental and health standards

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In an effort to combat climate change there is a major rush to eliminate the use of fossil fuels. However, this must be done in an orderly process to avoid stressing an already overstressed planet. The push for electric cars and lithium batteries requires intensive mining to extract the heavy metals needed to meet increasing global demands. This is in addition to the already staggering increase in the worldwide usage of digital devices and electronics that require the same metals. Heavy metals such as nickel, chromium, iron, zinc, manganese and cobalt, at very low concentrations, are all essential to the growth and development of plants [1-3]. Many of them also play an important role in human metabolisms, such as iron in hemoglobin and cobalt in vitamin B12 [4,5]. However, the history of mining is fraught with a legacy of devastation as higher levels of these heavy metals are toxic to both the environment and human health. In fact, international non-governmental organizations raised strong objections to the World Bank's Climate Smart Mining Facility's promotion of low carbon energy mining technologies, claiming that they perpetuate environmental and social harm [6,7]. This is particularly true for cobalt as it is such a critical element, but its toxicity raised great concerns for bioremediation [8]. The demand for cobalt globally has increased from 65,000 tons in 2010 to over 90,000 tons in 2015 and is expected to reach 218,000 tons by 2028 [9,10]. The major producer of cobalt is the Dominion Republic of Congo (DRC), which accounts for roughly 60% of the world's supply. While the mining of cobalt in DRC is considered a positive economic development, serious concerns have been raised regarding the lack of occupational and health standards as well as the occurrence of serious human rights violations [11-14]. The environmental and global impact of cobalt extraction was investigated by Farjana, et al. [15]. Using the International Reference Life Cycle Data System (ILCD) and Cumulative Energy Demand method (CED) per Kg of cobalt production. Eutrophication and global warming impacts were attributed to medium voltage electricity, blasting operations, and diesel fuel used in industrial machinery for extracting cobalt. A comparison of nickel and copper mining showed nickel mining was the most energy-intensive process followed by cobalt mining, with copper mining the safest of all three processes. The prevalence of child labor abuses in cobalt mining in DRC was highlighted in several recent reports by Amnesty International [16,17]. Close attention must be given to regulating safe practices in the production of heavy metals, such as cobalt, as those concerned with the protection of the climate will be bereft in their duties to protect the child labor force, the communities, and the environments involved. Recycling lithium-ion batteries may help in the short term to alleviate cobalt shortages but will be unable to keep up with increasing demands [18]. Considerable efforts are being made to eliminate cobalt from lithium batteries including the development of Nickel-Manganese-Aluminum (NMA) cathodes [19,20].

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