

and humility to reject this ‘genius’ honour. Lowry gave encouragement to non-genius types by titling his autobiographical paper with the caption ‘How to succeed in research without being a genius’<sup>38</sup>. As of now, Lowry holds the rank of most cited scientist in the history of scientometrics, for co-authoring the protein determination method paper, that has accumulated >300,000 citations<sup>39,40</sup>. In conclusion, I let Jones to have the last word: ‘The number of those whose claims to belong to this Olympus are universally recognized is very small. After listing such names as Newton, Darwin and Einstein we begin to enter a more debatable territory’<sup>41</sup>.

1. Pai, S. A. and Pandya, S. K., *Curr. Sci.*, 2018, **114**, 709–710.
2. Godlewski, G., *La Semaine des hopitaux* (Paris), 1979, **55**, 2051–2063.
3. Christen, A. G., *Bull. Hist. Dent.*, 1982, **30**(1), 8–18.
4. Rowland, L. P., *Arch. Neurol.*, 2001, **58**(3), 512–515.
5. Scarani, P., *Pathologica*, 1998, **90**(2), 186–192.
6. Ruben Perino, F., *Dia Med.*, 1962, **34** (Spec), 896.
7. Henry, R., *Union Med. Can.*, 1994, **123**(4), 240–241; 244–245.
8. Rodin, J. D. and Kay, J. D., *J. Med. Biogr.*, 1994, **2**(2), 98–102.
9. Egri, B., *Orvosi Hetilap* (Hungarian Med. J.), 1980, **121**, 3207–3212.
10. Rengachary, S. S., Colen, C. and Guthikonda, M., *Neurosurgery*, 2008, **62**(4), 954–964.
11. Dahlkvist, T., *J. Hist. Ideas*, 2015, **76**(4), 587–608.
12. Akmal, M., Zulkifle, M. and Ansari, A. H., *Heart Views*, 2010, **11**(1), 26–30.
13. McDonald, W. H., *J. Med. Assoc. State Alabama*, 1978, **48**(5), 20–23.
14. Caffier, P. P. and David, M., *Laryngorhinootologie*, 2009, **88**(1), 39–44.
15. Shapiro, E., *Am. J. Cardiol.*, 1972, **30**(6), 662–665.
16. Wells, W. A., *Arch. Otolaryngol.*, 1949, **48**(1), 58–66.
17. Carmichael, E. B., *Am. Surg.*, 1959, **25**(6), 374–379.
18. Pecker, S., *Turk. Neurosurg.*, 2014, **24**(6), 821–822.
19. Montes-Santiago, J., *Prog. Brain Res.*, 2013, **203**, 223–240.
20. Janssen, M. and Renn, J., *Nature*, 2015, **527**, 298–300.
21. West, J. B., *Physiology* (Bethesda), 2014, **29**(4), 222–233.
22. Harvey, A. M., *Johns Hopkins Med. J.*, 1974, **135**(5), 358–368.
23. King, D. F., *Am. J. Dermatopathol.*, 1987, **9**(1), 74–75.
24. Batt, R. E., *J. Min. Invasive Gynecol.*, 2007, **14**(5), 536–537.
25. Cytowic, R. E., *N. C. Med. J.*, 1975, **36**(11), 679–681.
26. Becher, P., Patai, A. and Majer, K., *Lege Artis Med.*, 2010, **20**(8), 538–540.
27. Wagner, H., *J. Nucl. Med.*, 2003, **44**(11), 26; 28; 34.
28. Ehrenwald, J., *J. Am. Acad. Psychoanal.*, 1979, **7**(1), 45–55.
29. Place, R. J., *Mil. Med.*, 2015, **180**(3), 259–262.
30. Descotes, J., *Lyon Med. (Suppl)*, 1969, 157–159.
31. Willis, H. J., *Clin. Cardiol.*, 1986, **9**(1), 35–37.
32. Scarani, P., *Pathologica*, 2000, **92**(1), 1–4.
33. Eynon-Lewis, N. J., Ferry, D. and Pearse, M. F., *Br. Med. J.*, 1992, **305**, 1534–1536.
34. Brown-Sequard, C. E., *Br. Med. J.*, 1893, **1**, 1145–1147.
35. Brown-Sequard, C. E., *Br. Med. J.*, 1893, **1**, 1212–1214.
36. Wilson, J. D., *J. Clin. Endocrinol. Metab.*, 1990, **71**, 1403–1409.
37. Jones, E., *The Life and Work of Sigmund Freud, Vol. 2 – Years of Maturity, 1901–1919*, Basic Books Inc., New York, 1955, p. 415.
38. Lowry, O. H. *Ann. Rev. Biochem.*, 1990, **59**, 1–27.
39. Van Noorden, R., Mahen, B. and Nuzzo, R., *Nature*, 2014, **514**, 550–553.
40. Sri Kantha, S., *Curr. Sci.*, 2015, **109**, 1545–1548.
41. Jones, E., *Br. Med. J.*, 1956, **2**, 257–262.

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## How popular is earth science?

Rasoul Sorkhabi

How popular is earth science? There are various ways to assess the place of earth science in our education and society. A few years ago, the American Geoscience Institute collected data on high school science graduation requirements for all states in the USA. The survey found that while 22 states accepted an earth and space science course for graduation, only two states required a year-long earth/environmental science course, whereas the number of states that required life science and physical science courses for graduation were 50 and 30 respectively<sup>1</sup>. Overall, earth science education is underrated in our middle and high schools. However, earth science should be an

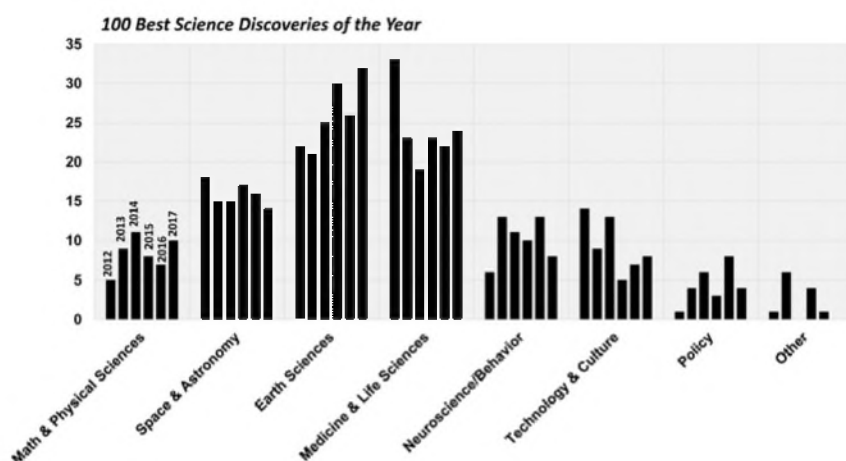
integral part of secondary (K12) education. There are many reasons for this. According to The National Earth Science Teachers Association’s position statement, teaching earth science ‘offers experience in a diverse range of interrelated scientific disciplines; it is closely related to the student’s natural surroundings and offers students subject matter which has direct application to their lives and the world around them’<sup>2</sup>. The good news is that the public have an enormous interest in earth science. This is evident from the public coverage of science news by the mass media. For example, the popular science magazine *Discover* publishes, in its January–February issue, the ‘100 Top

Stories’ of the previous year. I usually read these issues. Recently, I tabulated the *Discover*’s ‘100 Top Stories’ for the past six years (2012–2017) under nine categories (Table 1): (1) mathematics and physical sciences, (2) space science and astronomy, (3) earth, environment and energy, (4) archaeology and palaeontology, (5) medicine and life sciences, (6) neuroscience and behavioural sciences, (7) technology as related to culture and entertainment, (8) policy issues, and (9) other. Of these, ‘earth, environment, and energy’ category as well as ‘archaeology and palaeontology’ category belong to the earth science in a broad sense. Note that most of the discoveries

## COMMENTARY

**Table 1.** ‘100 Best Discoveries of Science’ reported by the *Discover* magazine (January–February issues, 2013–2018)

Disciplines	2012	2013	2014	2015	2016	2017
Math and physical sciences	5	9	11	8	7	10
Space and astronomy	18	15	15	17	16	14
Earth, environment and energy	11	13	14	11	9	13
Archaeology and palaeontology	11	8	11	19	17	19
Medicine and life sciences	33	23	19	23	22	24
Neuroscience/behaviour	6	13	11	10	13	8
Technology and culture	14	9	13	5	7	8
Policy	1	4	6	3	8	4
Other	1	6	0	4	1	0



**Figure 1.** ‘100 Best Discoveries of Science’ reported by the *Discover* magazine (January–February issues, 2013–2018) and categorized by subject.

related to ‘archaeology’ were concerned with the evolution of humans (human palaeontology or physical anthropology), and hence should be included in ‘earth

science’. Thus, the earth science category topped the list for the years 2014, 2015, 2016 and 2017; it was second only to ‘medicine and life sciences’ for the

years 2012, 2013 (see Figure 1). Although there is some subjectivity in choosing the ‘best’ science discoveries for a given year, it is reasonable to assume that the editors of the *Discover* consider both the importance of the discoveries and public (readers’) interest in them. All these are good news to earth scientists. The challenge is how to utilize these resources in our education (both formal and public), research projects, policy debates, and contributions to culture as a whole. Let me end this commentary with a testimony from NASA. Last November, the space agency, given the concerns that the new administration may reduce its budget, emphasized: ‘NASA’s work on Earth Science is making a difference in people’s lives all around the world. Earth Science helps save lives. It also helps grow companies and creates an awareness of environmental challenges that affect our lives today and tomorrow’<sup>3</sup>.

1. [https://www.americangeosciences.org/sites/default/files/education-reports-Secondary-ES\\_Report.pdf](https://www.americangeosciences.org/sites/default/files/education-reports-Secondary-ES_Report.pdf)
2. <http://www.nestanet.org/cms/content/policy/nestaposition#imp>
3. <http://spacenews.com/nasa-emphasizes-importance-of-earth-science-given-concerns-about-budget-cuts/>

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