

The Benefit of the London Scale for Astrobiology

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Introduction

The Rio Scale was developed in 2000 by Iván Almár and Jill Tarter to help media gauge the significance of a claimed discovery of an extra-terrestrial intelligence. The name “Rio Scale” was proposed, as it was first presented at the 51st International Astronautical Congress in Rio de Janeiro. It was intended to set an appropriate level of alertness on a 10-point linear scale to help scientists and reporters understand such an event’s importance. The scale has been slightly modified later by Almár (see its 1.1 Version in [1]). The Rio Scale, in its present form proved to be a simple, but useful tool in several SETI cases during the past 17 years.

Nevertheless a group of SETI experts started in 2017 to revise the Rio Scale in order to help calibrate public expectations of tentative signals [2]. The paper will be published in the near future.

Already in 2011 I have emphasized in [1] that SETI and astrobiology are converging research areas, in the analysis of the atmospheric composition of recently discovered Earth-like extrasolar planets in particular. My Editorial in JAO [3], published in 2014, also dealt with a confusing concept, the ‘habitability’, both in astrobiology and in SETI. Recently, however, several respected SETI experts wrote white papers declaring emphatically that “SETI is Part of Astrobiology” [4,5].

Here is a citation from the white paper of Jason Wright: ‘Traditional SETI is not part of astrobiology’ declares the NASA Astrobiology Strategy 2015 document. This is incorrect. In this white paper, I argue that SETI– seen as the search for technosignatures characteristic of the future of life in the universe– is a neglected complement to the search for biosignatures in NASA’s astrobiology portfolio, and may offer the more fruitful avenue to the discovery of life elsewhere in the universe.” Another white paper by Jill Tarter, John Rummel, Andrew Siemion, Martin Rees, Claudio Maccone and Greg Hellbourg is concentrating on technosignatures and astrobiology. Its conclusion is: NASA and its funding vehicle, ROSES should support also SETI activity. In the text of ROSES 2017 there is already a sentence under element “Biosignatures and Life Elsewhere” accepting that “research focused on understanding or characterizing nonradio ‘technosignatures’ from extrasolar planets that may harbor intelligent life are included in this area.” But this is not enough. The conclusion of the white paper is: “It is time that we end this scientific schizophrenia”.

During the Discussion Meeting The detection of extra-terrestrial life and the consequence for science and society’ organized by the Royal Society in London in 2010 I have introduced the London Scale for astrobiology. It has been published with Margaret Race as co-author [6]. Its structure and logic are intentionally analogous to the Rio Scale. The result is an index (LSI) between 0 and 10, which can be used to evaluate and present complex information about the scientific importance, validity and potential consequences of an alleged discovery of ET life. The higher values are indicative of more

scientifically important discoveries. The index is defined as $LSI = Q \times \delta$, where Q is the sum of four parameters (selected from the first four columns of the following table) and δ , representing the assessed credibility of a claimed discovery, is selected from the fifth column. The selected parameters associated with the Q value is intended to flow from objective, relevant facts about the purported discovery, but may change with time. The credibility value δ is more subjective and likely to vary over time as new research or findings add useful information.

Applying a standard scale to various ‘discoveries’ is a way for the science community and the public to examine the various factors that go into a claim or announcement, helping any relation with the media and also some of the astrobiological outreach programs (Figure 1).

Parameter Values & Reliability Factor Associated with London Scale Index				
LIFE FORM	EVIDENCE	DISCOVERY	DISTANCE	RELIABILITY FACTOR (δ)
value	value	value	value	
5 Completely alien	6 Complex life	5 Sample return mission analysis	4 Zero distance (on Earth)	0.5 Certain / highly reliable
4 Non-terrestrial / uncertain	5 Simple life	4 Found on Earth or in the atmosphere	3 Inside the orbit of Jupiter	0.4 Probably real
3 Unknown variant of terrestrial life	4 Extant life / suspended functioning	3 In situ manned mission	2 On or outside the orbit of Jupiter, but in the Solar System	0.3 Testable, needs further evidence
2 Terrestrial type / uncertain	3 Uncertain whether living or not	2 In situ surface robot	1 Beyond the Solar System	0.2 Controversial, but not rejectable
1 Possible, but indirect information	2 Fossilized life / remnants	1 Remote sensing	0 Fake or fraudulent	0.1 Probably not real
	1 Biomarkers (indirect evidence)			

Iván Almár and Margaret S. Race: Discovery of Extraterrestrial Life: Assessment by Scales of Its Importance and Associated Risks

Figure 1: Parameter values & Reliability factor associated with London scale index.

My conclusion is that the London Scale, or a new version of it revised by experts in astrobiology, is a demand of our age. If a convergence between Rio Scale Version 2.0 and the new London Scale

is feasibility then the result would promote our outreach activity clarifying the modern efforts of astrobiology and SETI at the same time.

References

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