This record is presented in recognition of contributions to Eterna, the internet-scale molecular design platform. Verify authenticity of this record at: https://eternagame.org/certificate/20

| | |
|---|---|
| ISSUED | November 16, 2026 |

## PLAYER DETAILS

| | |
|---|---|
| PERSONAL NAME | rhiju |
| PLAYER NAME | rhiju |
| REGISTRATION DATE | January 2010 |
| GLOBAL RANK | 1,110 of 472,852 |
| PUZZLES CLEARED | 298 |
| PUZZLES CREATED | 2 |
| TUTORIALS CLEARED | 4/5 |
| ADVANCED TUTORIALS CLEARED | 9/10 |

Eterna puzzles are created by the Eterna team or players. They invite players to devise effective procedures for pairing nucleotides in hypothetical or biologically-inspired RNA strands.

Learn more on rhiju's player profile: https://eternagame.org/players/20

## PUBLICATION CONTRIBUTIONS

*Contributions towards pre-print or peer-reviewed scientific publications.*

**1. RNA DESIGN RULES FROM A MASSIVE OPEN LABORATORY**

February 2014 Proceedings of the National Academy of Sciences *Author*

**2. PRINCIPLES FOR PREDICTING RNA SECONDARY STRUCTURE DESIGN DIFFICULTY**

February 2016 Journal of Molecular Biology *Author*

**3. ETERNABRAIN: AUTOMATED RNA DESIGN THROUGH MOVE SETS FROM AN INTERNET-SCALE RNA VIDEOGAME**

June 2019 PLOS Computational Biology *Author*

**4. RNA SECONDARY STRUCTURE PACKAGES EVALUATED AND IMPROVED BY HIGH-THROUGHPUT EXPERIMENTS**

October 2022 Nature Methods *Author*

**5. SENTRNA: IMPROVING COMPUTATIONAL RNA DESIGN BY INCORPORATING A PRIOR OF HUMAN DESIGN STRATEGIES**

March 2018 Preprint *Author*

**6. THEORETICAL BASIS FOR STABILIZING MESSENGER RNA THROUGH SECONDARY STRUCTURE DESIGN**

September 2021 Nucleic Acids Research *Author*

**7. CROWDSOURCED RNA DESIGN DISCOVERS DIVERSE, REVERSIBLE, EFFICIENT, SELF-CONTAINED MOLECULAR SENSORS**

April 2022 Proceedings of the National Academy of Sciences *Author*

**8. PROSPECTS FOR RECURRENT NEURAL NETWORK MODELS TO LEARN RNA BIOPHYSICS FROM HIGH-THROUGHPUT DATA**

December 2017 Preprint *Author*

**9. COMBINATORIAL OPTIMIZATION OF MRNA STRUCTURE, STABILITY, AND TRANSLATION FOR RNA-BASED THERAPEUTICS**

March 2022 Nature Communications *Author*

**10. REDESIGNING THE ETERNA100 FOR THE VIENNA 2 FOLDING ENGINE**

August 2021 Preprint *Author*

**11. DEEP LEARNING MODELS FOR PREDICTING RNA DEGRADATION VIA DUAL CROWDSOURCING**

December 2022 Nature Machine Intelligence *Author*

**12. COMMUNITY SCIENCE DESIGNED RIBOSOMES WITH BENEFICIAL PHENOTYPES**

February 2023 Nature Communications *Gameplay Contributor, Author*

**13. MINIMIZATION OF THE E. COLI RIBOSOME, AIDED AND OPTIMIZED BY COMMUNITY SCIENCE**

January 2024 Nucleic Acids Research *Author*

**14. OPENASO: RNA RESCUE — DESIGNING SPLICE-MODULATING ANTISENSE OLIGONUCLEOTIDES THROUGH COMMUNITY SCIENCE**

July 2025 RNA *Author*

### 15. COMPACT RNA SENSORS FOR INCREASINGLY COMPLEX FUNCTIONS OF MULTIPLE INPUTS

November 2025 Nature Chemistry *Gameplay Contributor, Author*

### 16. DE NOVO DESIGN OF RNA PSEUDOKNOTS WITH DEEP LEARNING

May 2026 Science *Author*

## DESIGN SUBMISSIONS

*Contributions towards Eterna biomedical challenges experimentally tested through in-vitro synthesis and structure mapping measurements.*

| | TOTAL (#) | TESTED | BEST (%) |
|---|---|---|---|
| The Finger | 2 | 0 | 0 |
| Bulgeless Cross | 1 | 0 | 0 |
| One Bulge Cross | 1 | 0 | - |
| Classic Eterna | 1 | 1 | 83 |
| First Player Project | 1 | 1 | 79 |
| Cloud Lab 20 - Random 4 by mat747 | 1 | 0 | 67 |
| Testing 3D structure prediction of G/G mismatches (boosts!) | 16 | 0 | 92 |
| Testing for crazy conformations of tandem G/A and A/G pairs | 18 | 0 | 86 |
| A codon riboswitch | 47 | 0 | 94 |
| Codon riboswitch [repeat of tryptophan] | 47 | 0 | 0 |
| Codon riboswitch [arginine] | 59 | 0 | 0 |
| Codon riboswitch [histidine] | 63 | 0 | 0 |
| Eterna History Tour - Introduction to Lab | 2 | 1 | 87 |
| miRNA Switch Lab round 2 for Rhiju's class | 1 | 1 | 65 |
| MS2 Cooperative Binding | 5 | 5 | 74 |

| | | | |
|---|---|---|---|
| MS2 Cooperative Binding - Round 3 | 5 | 5 | 74 |
| OpenCRISPR - Controls | 21 | 0 | - |
| OpenRibosome Pilot Challenge | 1 | 0 | 50 |
| Testing Lab mgotrik | 5 | 0 | - |
| OpenRibosome Pilot Challenge Warm-up | 1 | 0 | - |
| OpenVaccine: [Round 6] Focus on Nanoluciferase mRNA | 4 | 0 | 94 |
| OpenVaccine B.1.617 with Pseudouridine | 1 | 0 | - |
| Pseudoknot Challenge: Pilot round | 1 | 1 | 49 |
| OpenKnot Round 1 | 92 | 86 | 46 |
| Pseudoknot Detective | 1 | 1 | 45 |
| Replicase Round 1 | 1 | 0 | - |

TOTAL (#): The total number of design submissions made to an Eterna challenge.
TESTED: The total number of design submissions made to an Eterna challenge that were experimentally tested.
BEST (%): Player's best score (as a percentage) for experimentally tested design submissions made to an Eterna challenge

