

COLLABORATION AGREEMENT

This collaboration agreement (hereinafter the “Agreement”) is entered into as of September 5th 2023 (the “Effective Date”).

BETWEEN

The Royal Institution for the Advancement of Learning/McGill University having a principal place of business at 845 Sherbrooke Street West, James Administration Building, Montréal, Québec, H3A 0G4 (hereinafter “McGill”)

AND

Costa Rica Institute of Technology (ITCR), Biotechnology Engineering Program incorporated under the laws of [Costa Rica] having its principal place of business at [Cartago, Cartago, Calle 15, Avenida 14, 1 km Sur de la Basílica de los Ángeles, ZIP: 159-7050], (hereinafter “ITCR”).

(McGill and ITCR are hereinafter referred to individually each as a “Party” and collectively as the “Parties”).

WHEREAS Dr. Codruta Ignea from McGill Department of Bioengineering, together with Lallemand Inc., has submitted a proposal entitled “Metabolic Engineering and Synthetic Biology approaches for sustainable and efficient production of carotenoids in yeast” to the Consortium de recherche et d’innovation en bioprocédés industriels au Québec (“CRIBIQ”) and to the Natural Sciences and Engineering Research Council of Canada (“NSERC”) which was awarded;

WHEREAS ITCR will send an undergraduate research trainee, Kate Willis-Urena to work on the Project, as defined in Schedule “A” herein;

WHEREAS McGill and ITCR have in common the desire to encourage and facilitate the discovery, dissemination and application of new knowledge, in joint collaboration under this Agreement;

THE PARTIES AGREE AS FOLLOWS:

1 DEFINITIONS

For the purpose of this Agreement, the following terms, words, phrases and expressions, when used in the singular or plural, are defined as follows:

- 1.1 “Background Intellectual Property” means any and all Intellectual Property conceived, developed, reduced to practice or otherwise made or acquired by a Party prior to the Effective Date or outside the scope of this Agreement.
- 1.2 “Confidential Information” means any written information clearly marked “Confidential” or any information provided verbally by one Party to the other and identified as confidential at the time of disclosure.
- 1.3 “Disclosure” means the publication of theses, articles, and scholarly writings or oral or written presentations at lectures, conferences or seminars.
- 1.4 “Forward Intellectual Property” means any and all Intellectual Property patentable or

otherwise protectable by statute, conceived, developed, or reduced to practice or otherwise made by a Party in the course of collaboration under this Agreement.

- 1.5 “Intellectual Property” means scientific formulae, data, discoveries, inventions, ideas, software, models, prototypes, specifications, patterns, drawings, algorithms, concepts, products, compositions, processes and protocols, methods, tests and improvements, know-how, machines, devices, and computer programs and includes any and all patents, patent rights and patent applications which embody, emulate or employ any part of the foregoing.
- 1.6 “Scientific Coordinator” means the persons identified in section 2.2.
- 1.7 “Project” means the scope of work described in Schedule “A” (Description of the Scope of Work).

2 RESEARCH PROJECT

- 2.1 **Scope of the Project.** The Parties shall use reasonable efforts to carry out the Project. The Project may from time to time be modified by mutual consent of the Parties in accordance with Article 14.9.
- 2.2 **Technical Management:** Each Party will appoint a Scientific Coordinator to act as a liaison between the Parties on technical matters that may arise during the course of the Project. Each Party may change its Scientific Coordinator by giving notice to the other Parties. The appointed Scientific Coordinators are:

For McGill: Professor Codruta Ignea

Tel: +1-514-603-3151

E-mail: codruta.ignea@mcgill.ca

For ITCR: Luis Barboza Fallas, Internal Tutor at ITCR and Giovanni Garro Monge, Coordinator of Final Graduation Projects.

Tel: +506 2550 9409

E-mail: lubarboza@itcr.ac.cr and ggarro@itcr.ac.cr

- 2.3 **The Scientific Coordinators will:**
 - 2.3.1 Receive and transmit all information between the Parties;
 - 2.3.2 Coordinate the exchange of Background Intellectual Property and the disclosure of Forward Intellectual Property;
 - 2.3.3 Coordinate and schedule periodic discussions of the results, problems and status of each Party’s performance under this Agreement;
 - 2.3.4 Schedule and coordinate the exchange of reports and visits by personnel of each Party to facilities of the other Party, if desired, and other meetings and periodic reviews as appropriate;
 - 2.3.5 Coordinate any decision that must be made jointly, such as choice of materials and publications;
 - 2.3.6 Coordinate any joint publication based on the Project and initially handle any disputes that may arise between the Parties.

3 DELIVERABLES

- 3.1 **Reports.** In accordance with the terms of Schedule “A”, the Scientific Coordinators will provide each other with reports indicating progress of the Project, and results obtained, however, neither Party makes any warranties regarding the achievement of any particular results. The Parties will collaborate to create a final report no later than three (3) months

following completion of the Project.

- 3.2 **Acceptance.** Reports will be deemed to have been accepted by the other Party and to have been made and submitted in accordance with the terms and conditions of this Agreement, unless notification is made to the receiving Party to the contrary within thirty (30) days of receipt of such report.

4 **TERM AND TERMINATION**

4.1 **Term.** This Agreement shall come into force on the Effective Date, and shall terminate on June 30th, 2024 unless terminated earlier in accordance with the provisions of sections 5.2 or 5.3, below.

4.2 **Termination at Discretion of Party.**

4.2.1 Any Party may terminate its participation in this Agreement by notifying the other Parties, in writing, of its intention to terminate. Such notice shall be no less than sixty (60) days before the intended termination date.

4.2.2 Where this Agreement is terminated in accordance with 5.2.1, the Parties shall use their best endeavours to wind up the collaborative activities carried out under the Agreement, and where applicable, complete any outstanding work during the relevant action periods.

4.3 **Termination for default.** Either Party may terminate this Agreement immediately upon notice to the other Party, in the event of:

4.3.1 material breach or non-compliance by the other Party of some obligation, undertaking, representation or warranty contained in this Agreement, if such default is not remedied within thirty (30) days of receipt of written notice to that effect;

4.3.2 the other Party becoming bankrupt or insolvent, going into receivership, making an assignment of its assets to the benefit of its creditors, taking advantage of any statute which may be in force in relation to bankruptcy or insolvent debtors, or ceasing to conduct business in the normal course; or

4.3.3 default on the part of the other Party caused by a force majeure, where such default lasts for more than six (6) months.

4.4 **Other:** Either Party shall also be able to terminate this Agreement, in its own discretion and without penalty or compensation to the other Party, in the event that the Scientific Coordinator leaves their employment, becomes permanently disabled, or passes away. In such a case, the Parties will attempt in good faith to identify another Scientific Coordinator. Should they be unable to find a mutually acceptable replacement, the Parties shall be able to terminate this Agreement under this section. Either Party shall also be able to terminate this Agreement pursuant to section 9.4.

5 **CONFIDENTIALITY**

5.1 **Protection.** Each Party shall protect Confidential Information received from the other Party from disclosure to third parties with the same degree of care it uses in the protection of its own confidential information and shall not use such Confidential Information for any purposes outside the scope of this Agreement. The obligation to safeguard Confidential Information shall continue for a period of five (5) years from the date of termination or expiration of this Agreement and shall not apply to information which:

- 5.1.1 is already known to the receiving Party to which it is disclosed without breach of the provisions of this Agreement;
- 5.1.2 is or becomes part of the public domain without breach of the provisions of this Agreement;
- 5.1.3 is lawfully obtained from a third party;
- 5.1.4 is required by law to be disclosed;
- 5.1.5 is independently developed by one Party without reference to Confidential Information provided by the other Party.

6 DISCLOSURE AND PUBLICATION

- 6.1 **Acknowledgement.** The Parties acknowledge that it is part of McGill's function to disseminate information and to make it available for the purpose of scholarship, education and research, and that McGill does not allow research to be carried out in secret. They also recognize that, although eventual publication of results of research may not be prevented, publication of certain information may jeopardize its commercial value.
- 6.2 **Publication.** Until the end of the second year following the expiration or termination of this Agreement, each Party shall provide to the other Party a copy of any proposed Disclosure (the "Notice") relating to the research carried out under the Project either when said proposed Disclosure is submitted for publication or thirty (30) days in advance of the date of Disclosure (the "Notice Period"). If the receiving Party determines that the Disclosure contains their Confidential Information or unprotected Forward Intellectual Property and so notifies the disclosing Party within twenty (20) days of receipt of the Notice, the Parties shall use the remainder of the Notice Period to negotiate in good faith the protection of any Confidential Information or to allow patent applications to be filed, if required. In the event the twenty (20) day period elapses without any notification from the other Party, the disclosing Party shall be free to make the Disclosure. There will be no delays in student thesis defence and no publication delays of more than six months.

7 INTELLECTUAL PROPERTY

- 7.1 **Background Intellectual Property.** Each of the Parties, subject to any third-party rights that may exist, agree to provide, free-of-charge, a non-exclusive, non-transferable, licence to any Background Intellectual Property which shall be limited solely for the purpose of performing work under this Agreement.
- 7.2 **Rights to Forward Intellectual Property:** Without divesting either Party of Intellectual Property rights that have come to being prior to this Agreement all Forward Intellectual Property shall vest in McGill.
- 7.3 **Forward Intellectual Property Disclosure.** ITCR shall promptly, and no later than three (3) months after the expiry date of this Agreement, report and fully disclose in writing to McGill any and all Forward Intellectual Property.

8 REPRESENTATIONS AND WARRANTIES

- 8.1 **Representations.** The Parties represent and warrant to each other that:
 - 8.1.1 they each have full authority to enter into this Agreement;
 - 8.1.2 their undersigned representatives have full authority to execute this Agreement on their

behalf;

- 8.1.3 the performance of their respective obligations under this Agreement will not violate the terms of any other agreement or contract to which they are a party.
- 8.2 **Warranty Disclaimer:** Neither Party makes any express warranties and disclaims any implied warranties as to any matter relating to this Agreement, including without limitation the performance or results of the Project; the availability of legal protection for any research results, inventions, copyrightable works, or any other work product pursuant to this Agreement. **There are no express or implied warranties of merchantability or fitness for a particular purpose for any of the research results, or that the use of research results will not infringe any patent rights or other proprietary rights of a third party, or that the work undertaken during the course of the Project will be eligible for tax credits.**

9 EXPORT CONTROLS AND CONTROLLED GOODS

- 9.1 In the event that goods or information falling under Canadian or United States export control rules or controlled goods regulations are required to be provided by one Party to another, this shall be done in writing, in accordance with section 14.2, "Notices", prior to any such disclosure. Neither Party shall forward or provide any such information to the other Party without the express written permission of the receiving Party. Information shall be made available only to eligible individuals as designated by the authorised representatives of the Parties. The Parties shall cooperate to obtain the appropriate license or approval from the relevant agency, or to invoke an available exception, exemption or exclusion, where applicable.
- 9.2 Notwithstanding the above, no goods or information subject to International Traffic in Arms Regulations (ITAR) shall be transferred by one Party to another under this Agreement.
- 9.3 In the event that the Project research results or any data developed in the course of the Project constitute controlled goods under Canadian law, the Parties will cooperate so that the requirements of the law are met prior to disclosure of such results or data.
- 9.4 Either Party shall have the right to terminate this Agreement under Section 5, "Term and Termination", if they are unable to comply with any applicable export control or controlled good regulations.

10 INDEMNIFICATION AND LIABILITY

- 10.1 **Indemnification by McGill.** During the term of this Agreement, and except where they have been caused or contributed to by ITCR's negligence or wilful misconduct, McGill shall indemnify and hold ITCR harmless of any and all cost, suits, claims or damages on account of injuries (including death) to the McGill Scientific Coordinator, members of the research team and any other person, caused by its negligence or that of its employees, agents and representatives. McGill shall also hold ITCR harmless of any or all damages to McGill property, except where such damages have been caused or contributed to by ITCR's own negligence.
- 10.2 **Indemnification by ITCR.** During the term of this Agreement, and except where they have been caused or contributed to by McGill's negligence or wilful misconduct, ITCR shall indemnify and hold McGill harmless of any and all cost, suits, claims or damages on

account of injuries (including death) to the ITCR Scientific Coordinator, members of the research team and any other person, caused by its negligence or that of its employees, agents and representatives. ITCR shall also hold McGill harmless of any or all damages to ITCR property, except where such damages have been caused or contributed to by McGill's own negligence.

10.3 **Liability.** Neither Party shall be liable to the other for indirect or consequential damages.

11 PUBLICITY AND USE OF NAMES

11.1 **Use of name.** Neither Party shall use the other Party's name or trademark or any adaptation thereof without the prior written consent of its duly authorized representative. Specifically, neither Party will have the right to use the name of the Scientific Coordinators or members of the research team, without the specific written permission of an authorized representative of the Party.

11.2 **Publicity.** Neither Party will issue any press release or publicity concerning this Agreement or the Project and its subject matter except with prior written consent from the authorized representative of the other Party, which consent shall not be unreasonably withheld. Consent given by either Party in respect of a particular publicity or press release shall not be deemed to be consent to any other publicity or press release. Notwithstanding the foregoing, the Parties shall have the right to disclose the existence of this Agreement (title and Scientific Coordinators) in any prospectus, offering memorandum or other document or filing required by law or securities regulations.

11.3 **Acknowledgment.** The Parties agree that any Disclosure, press release or publicity will fairly represent the contribution of each Party to the Project as well as that of the Scientific Coordinators and other members of the research team, as appropriate.

12 DISPUTE RESOLUTION

12.1 **Cooperation.** Each Party to this Agreement agrees to cooperate with the other to ensure that each may enjoy all rights conferred under such Agreement.

12.2 **Mediation.** The Parties shall attempt to resolve any dispute, controversies, and claims with respect to this Agreement amicably through good faith negotiations. In the event that the Parties fail to resolve their differences, the matter shall be first submitted to a mutually acceptable mediator, qualified by education and experience to review the matter. The Parties shall be responsible for their own costs and shall share the fees and expenses of the mediator.

12.3 **Arbitration.** Should the mediation process fail to resolve the dispute to the satisfaction of both Parties within thirty (30) days of the appointment of the mediator, the Parties shall submit their dispute to arbitration in front of a single arbitrator and in accordance with the provisions of articles 620 and following of the Code de procédure civile du Québec. The award and determination of the arbitrator shall be final and binding upon the Parties. Each Party to the arbitration shall pay its own costs, including the expenses and fees generated by the legal representation at arbitration.

13 GENERAL PROVISIONS

13.1 **Force majeure.** Neither Party shall be held responsible to the other Party for any default or delay in the execution of its obligations caused by circumstances beyond its control. Without limiting the generality of the foregoing, natural disasters, epidemics, pandemics,

strikes, fires, war and insurrections and actions of government or regulatory bodies, which prevent a Party from performing under the Agreement shall be deemed to constitute force majeure, provided however that the Party that is excused from performance takes all measures necessary to prevent, control or limit the effect of the force majeure so that performance may resume as soon as possible.

- 13.2 **Notices.** All notices, reports, requests, consents and other communications between the Parties pertaining to matters related to this Agreement (with the exception of payments as per section 3) shall be in writing, shall specifically refer to this Agreement and deemed duly received when actually received by mail or personal delivery, mailed by registered or certified mail to the receiving, at the address and/or e-mail mentioned below or to such other address which may later be designated by written notice from either Party.

The Royal Institution for the Advancement of Learning/McGill University:

Office of Innovation + Partnerships
James Administration Building, 4th Floor
845 Sherbrooke Street West
Montréal, Québec, H3A 0G4

**Costa Rica Institute of Technology (ITCR),
Biotechnology Engineering Program**

Cartago, Cartago, Calle 15, Avenida 14, 1 km Sur de
la Basílica de los Ángeles, ZIP: 159-7050

Attention:

Julie Vallée
Senior Industry Partnerships Officer
Tel: 514-398-3333
Email: julie.vallee@mcgill.ca

Attention:

Luis Barboza Fallas
Professor, Biology Faculty
Tel: 2550.9409
Email: lubarboza@itcr.ac.cr

- 13.3 **Waiver of rights.** No waiver or failure by the Parties to enforce their right or insist on strict performance of this Agreement shall be deemed to prevent the Parties from subsequently enforcing their rights or insist on strict performance under the Agreement. No waiver or failure to strictly enforce rights shall affect the validity of this Agreement.
- 13.4 **Severability.** The invalidity or unenforceability of any provision of this Agreement shall not affect the validity or enforceability of the Agreement itself or any of its provisions.
- 13.5 **Survival.** The provisions of sections 5 (Confidentiality), 6 (Disclosure and Publication), 7 (Intellectual Property) and 11 (Publicity) shall survive the termination of this Agreement.
- 13.6 **Independent Contractor.** For the purpose of this Agreement and all services to be provided hereunder, each Party shall be, and shall be deemed to be, an independent contractor and not an agent or employee of the other Party.
- 13.7 **Assignment.** Neither Party shall have the right to assign this Agreement without the written consent of the other Party. Such consent shall not be unreasonably withheld.
- 13.8 **Headings.** The headings contained in this Agreement are for convenience and reference only and shall not define or limit the scope, or affect the interpretation of, its provisions.
- 13.9 **Entire Agreement.** This Agreement constitutes the entire agreement and understanding between McGill and ITCR with respect to the Project. There are no understandings, representations or warranties between McGill and ITCR in respect of the Project, except as expressly set forth in this Agreement. Any modification to this Agreement shall be agreed to in writing and approved by an authorized representative of ITCR and McGill.

- 13.10 **Counterparts.** This Agreement may be executed in any number of counterparts by the Parties hereto in separate counterparts, each of which when so executed shall be deemed to be an original and all of which taken together shall constitute one and the same agreement. Delivery by electronic transmission in portable document format (PDF) of an executed counterpart of this Agreement is as effective as delivery of an originally executed counterpart of this Agreement
- 13.11 **Currency.** All monies referred to in this agreement are expressed in Canadian dollars, unless otherwise stated.
- 13.12 **Language.** Les Parties ont requis que cette entente soit rédigée en anglais. The Parties have requested that this Agreement be drafted in English.
- 13.13 **Governing law.** This Agreement shall be governed by the laws of Québec, and Canadian laws applicable therein without regard to their provisions on conflict of Law.

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This agreement has been executed by the Parties and on the dates hereto:

**The Royal Institution for the Advancement of
Learning/McGill University**



Julie Vallée
Associate Director, Industry Partnerships
(interim)

April 3 2024

**Costa Rica Institute of Technology (ITCR),
Biotechnology Engineering Program**

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Ing. María Estrada Sánchez, M.Sc.

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(FIRMA)
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V.B. Asesoría Legal - ITCR

Acknowledgement

I, **Dr. Codruta Ignea**, having read this Agreement, hereby agree to act in accordance with all the terms and conditions herein and further agree to ensure that all McGill participants are informed of their obligations under such terms and conditions.

Codruta Ignea

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Ignea
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Dr. Codruta Ignea

Acknowledgement

I, **Dr. Luis Barboza Fallas**, having read this Agreement, hereby agree to act in accordance with all the terms and conditions herein and further agree to ensure that all ITCR participants are informed of their obligations under such terms and conditions.

**LUIS ALFREDO
BARBOZA FALLAS
(FIRMA)**

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(FIRMA)
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Dr. Luis Barboza Fallas

Schedule "A"

Description of the Scope of Work

McGill University, Department of Bioengineering, Ignea Lab

Project Description for Non-Disclosure Agreement

Undergraduate Research Trainee

Kate Willis-Urena

Project Title: Engineering enzyme fusions to redirect metabolic flux towards high-yield lutein production in yeast.

Project Overview: The project will fall under the scope of a larger project, partially funded by the industry partner Lallemand, on establishing the production of target carotenoids in yeast. Specifically, this will serve as a subproject on work that targets high-yield lutein production in *Saccharomyces cerevisiae* through an enzyme engineering approach. Naturally, carotenoids are found in leafy green plants and microalgae, playing important roles in photoprotection and photosynthesis. Oxygenated carotenoids are soluble in animal tissue, making them extremely useful for human therapeutic use. Included in this classification is lutein, one of three leading compounds on the carotenoid market alongside astaxanthin and β -carotene. Lutein accumulates in the retina, protecting from blue light and improving symptoms of age-related macular degeneration. Useful applications for lutein also exist in agriculture and farming, where it can be seen as a food colorant and feed additive. As a subproject, this work will be centred around the generation of a protein fusion of three enzymes in the lutein biosynthetic pathway: CrtYB (a natural fusion of CrtY and CrtB found in *Solanum lycopersicum*) and CrtL-e. CrtYB acts on the substrate lycopene to produce both γ -carotene and δ -carotene, the upstream precursors to β -carotene and lutein respectively. However, γ -carotene is preferentially produced over the desired lutein precursors. The fusion designed in this subproject is expected to redirect metabolic flux towards δ -carotene for increased production of lutein over β -carotene.

Objectives: (1) To design the enzyme fusions *in silico*; (2) To predict the highest performing enzyme fusion through computational modelling of enzyme-substrate interactions; (3) To build the fusion constructs and obtain protein expression in yeast.

Milestones and Expected Results: (1) Suitable primer and construct design for CrtYB and CrtL-e fusion assembly; (2) Computational models of protein fusion interactions; (3) DNA plasmid constructs for the CrtYB/CrtL-e protein fusions confirmed via sequencing; (4) protein expression and lutein production in transformed yeast strains.

Deliverables: As requirements of the undergraduate research project, a pre-report proposal, a final thesis manuscript, and an oral presentation.

Timeline: September 5th to December 30th.