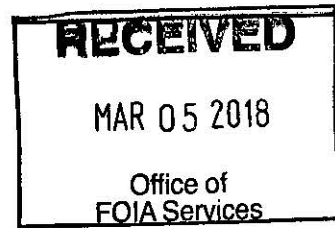


18-03014-E

March 5 2018

US Securities & Exchange Commission
Office of FOIA and Privacy Act Operations
100 F Street, NE Mail Stop 5100
Washington, DC 20549-5100



Dear FOIA Office:

Under the Freedom of Information Act (FOIA), please send a copy of the following:

A copy of: Exhibit 10.3A to the form S-1/A filed by CODEXIS INC on April 5, 2010

In the event confidential treatment has not expired provide the specific date for which confidential treatment is still in effect. I do not need a copy of the order. We authorize up to

\$61.00 in processing fees. Thank You,

Paul D'Souza
Managing Editor - Deals

Clarivate Analytics Friars House, 160 Blackfriars Road London, UK SE1 8EZ
Phone: +44-2074334789
paul.dsouza@clarivate.com



UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
STATION PLACE
100 F STREET, NE
WASHINGTON, DC 20549-2465

Office of FOIA Services

March 09, 2018

Mr. Paul D'Souza
Clarivate Analytics
160 Blackfriars Road
London, UK SE18EZ

RE: Freedom of Information Act (FOIA), 5 U.S.C. § 552
Request No. 18-03014-E

Dear Mr. D'Souza:

This letter is in response to your request, dated and received in this office on March 05, 2018, seeking access to Exhibit 10.3A to the Form S-1/A filed on April 5, 2010, by Codexis, Inc.

The search for responsive records has resulted in the retrieval of 54 pages of records that may be responsive to your request. They are being provided to you with this letter.

If you have any questions, please contact me at rollinsc@sec.gov or (202) 551-8329. You may also contact me at foiapa@sec.gov or (202) 551-7900. You also have the right to seek assistance from Aaron Taylor as a FOIA Public Liaison or contact the Office of Government Information Services (OGIS) for dispute resolution services. OGIS can be reached at 1-877-684-6448 or Archives.gov or via e-mail at ogis@nara.gov.

Sincerely,

A handwritten signature in black ink that reads "Carl Rollins".

Carl Rollins
FOIA Research Specialist

Enclosures

AMENDED AND RESTATED COLLABORATIVE RESEARCH AGREEMENT

Tms AMENDED AND RESTATED COLLABORATIVE RESEARCH AGREEMENT, together with exhibits and schedules attached hereto, (the "**Amended and Restated Research Agreement**" or the "**Agreement**") is entered into as of the Execution Date and effective as of November 1, 2006 (the "**EffectiveDate**"), by and between **Equilon Enterprises LLC dba Shell Oil Products US**, a Delaware limited liability company, having a place of business at 910 Louisiana Street, Houston, Texas 77002 ("**Shell**"), and **Codexis, Inc.**, a Delaware corporation, having a place of business at 200 Penobscot Drive, Redwood City, California 94063 ("**Codexis**"). Shell and Codexis may each be referred to herein individually as a "**Party**" or, collectively, as the "**Parties**."

RECITALS

WHEREAS, Codexis possesses certain valuable business and/or technical knowledge, information and/or expertise applicable to the enhancement of the performance of certain enzymatically catalyzed processes.

WHEREAS, Shell and Codexis entered into a certain Collaborative Research Agreement, effective as of November 1, 2006, as amended, pursuant to which Codexis has agreed to work exclusively with Shell in the Field of Use (as defined below) to develop certain new biocatalytic processes for use in the conversion of biomass to fuels and/or *fuel* additives and/or lubricants.

WHEREAS, the Parties desire to amend and restate such Collaborative Research Agreement to revise the scope of, and increase the resources devoted to, the collaboration between the Parties, all on the terms and conditions set forth below.

Now, T HEREOF, in consideration of the promises and undertakings set forth herein, the Parties agree as follows:

ARTICLE 1

DEFINITIONS

Capitalized terms not otherwise defined herein will have the meaning set forth below:

1.1 "Acquired Technology" has the meaning set forth in Section 7.1.

1.2 "Affiliate" means,

(a) with respect to Codexis, any business entity controlling, controlled by, or under common control with Codexis. For the purpose of this Section 1.2(a) only, "control" means (i) the possession, directly or indirectly, of the power to direct the management or policies of a business entity, whether through the ownership of voting securities, by contract or otherwise, or (ii) the ownership, directly or indirectly, of at least fifty percent (50%) of the voting securities

or other ownership interest of a business entity; provided that, if local law requires a minimum percentage of local ownership, control will be established by direct or indirect beneficial ownership of one hundred percent (100%) of the maximum ownership percentage that may, under such local law, be owned by foreign interests; and

(b) with respect to Shell, Royal Dutch Shell and any company (other than Shell) which is from time to time directly or indirectly affiliated with Royal Dutch Shell. For the purpose of this Section 1.2(b) only, a particular company is (i) directly affiliated with another company or companies if that latter company beneficially owns or those latter companies together beneficially own fifty per cent or more of the voting rights attached to the ownership interest of the particular company; and (ii) is indirectly affiliated with company or companies if a series of companies can be specified, beginning with that latter company or companies and ending with the first mentioned company, so related that each company of the series (except the latter company or companies) is directly affiliated with one or more of the companies earlier in the series.

1.3 "Amended and Restated License Agreement" means the Amended and Restated License Agreement entered into by Shell and Codexis on the Execution Date and effective as of the Effective Date.

1.4 "Biocatalyst" means an enzyme or a Microbe that can enzymatically catalyze a particular chemical reaction, and which enzyme or Microbe arose out of the Program.

1.5 "Biomass" means organic, non-fossil, plant-derived matter available on a renewable basis, including, for example, crops and/or trees grown or harvested for use for fuel and/or fuel additive production, agricultural food and feed crops, aquatic plants and, in each case, organic wastes derived from the foregoing, including municipal wastes (e.g., newspapers).

1.6 "Codexis Technology" means (a) the Shuffling Technology and any improvements to the Shuffling Technology developed by employees of or consultants to Shell and/or employees of or consultants to Codexis in performance of the Program; and (b) any other Technology that is or was (i) developed by employees of or consultants to Codexis, alone or jointly with Third Parties, prior to or during the Term outside the scope of activities described in any Research Plan; or (ii) acquired during the Term by purchase, license, assignment or other means from Third Parties by Codexis, in each of case (b)(i) and (b)(ii), introduced by Codexis into the activities to be conducted under any Research Plan.

1.7 "Confidential Information" means any and all non-public and proprietary Information that is specifically designated as such and that is disclosed by either Party to the other in written or other similar form in connection with this Amended and Restated Research Agreement and that, if orally or visually disclosed, shall be summarized in writing in detail and specifically designated as proprietary and such summary delivered to the receiving Party within thirty (30) days after such disclosure.

1.8 "Contract Year" means a year beginning on the Effective Date, or an anniversary of the Effective Date during the Term, and ending one (1) year after such respective date.

[*] Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

1.9 "Control" means, with respect to an item, Information, Patent Right or an intellectual property right, possession of the ability, whether arising by ownership or license or otherwise, to grant a license or sublicense as provided for herein under such item, Information, Patent Right or right without violating the terms of any written agreement with a Third Party.

1.10 "Execution Date" means November 1, 2007.

1.11 "Field of Use" means the conversion of (a) Biomass into fermentable sugars, such sugars to be converted into (i) liquid fuel and/or liquid fuel additives and/or (ii) Lubricants, and (b) fermentable sugars derived from Biomass into (i) liquid fuel and/or liquid fuel additives, and/or (ii) Lubricants. For purposes of this Section 1.11 only, (1) "liquid" means **[a substance that is a liquid at a temperature of twenty-five (25) degrees Celsius under atmospheric pressure]**, and (2) "fuel additive" means **[a substance which is added to fuel to modify the characteristics of such fuel, including, for example, biodegradability, combustibility, viscosity, performance and/or emissions profile]**. For avoidance of doubt the "Field of Use" shall not include any material obtained from Biomass that is used as an ingredient in human food or animal feed products.

1.12 "FTE" means the efforts of one or more employees of Codexis equivalent to the efforts of one Codexis full time employee (i.e., an employee that works at least one thousand seven hundred sixty (1760) hours per year).

1.13 "Information" means data, results, evaluations, inventions, Microbes, know-how, know-how, computer chip and programs, processes, machines, biological chemicals, intermediates, trade secrets, techniques, methods, developments, materials, methods of analysis, composition of matter, copyrights or other information.

1.14 "Lubricant" means **[materials compounded or blended from ingredients that are used primarily for lubrication of motor vehicles or mobile or stationary machinery or equipment, including engine oils, power steering fluids, transmission fluids, brake fluids, gear oils, shock absorber fluids, industrial fluids, process oils, metalworking oils, cutting oils, electrical oils, hydraulic oils, railroad oils, refrigerator oils, aircraft turbine, aircraft hydraulic and aircraft engine oils, food grade oils, turbine oils, greases and by-products of compound blending such as Jine wash, line clippings, cut oil and off-specification grease]**.

1.15 "Microbes" means whole (live or dead) prokaryotic organisms and/or yeasts and/or fungi or extracts thereof. Microbes shall not include land plants, including nonseed plants (Bryophytes, Tracheophytes) such as liverworts, mosses, ferns, and seed plants, such as gymnosperms and angiosperms (monocots and dicots); and/or non-land plants, including Prasinophytes, Chlorophyceae, Trebouxiophyceae, Ulvophyceae, Chlorokybales, Streptophyta, Klebsormidiales, Zygnematales, Charales, Coleochaetales and Embryophytes.

1.16 "Oversight Committee" has the meaning set forth in Section 2.3(a).

1.17 "Patent Rights" means all patent applications and patents, whether domestic or foreign, covering patentable inventions within the Codexis Technology, the Shell Technology and the Program Technology. As applicable, all continuations, continuations-in-part and divisions

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of such patent applications and of patent applications from which such patents issued, all patents issuing from any of such patent applications, and all renewals, reissues, re-examinations and extensions of any of such patents.

1.18 "Program" means the program of activities conducted by Codexis and/or Shell pursuant to this Amended and Restated Research Agreement, as further described in the Research Plans.

1.19 "Program Technology" means Technology (other than Codexis Technology and/or Shell Technology) either (a) developed by employees of or consultants to Shell and/or employees of or consultants to Codexis during the Term in the course of activities described in the Research Plans; or (b) acquired during the Term by purchase, license, assignment or other means from Third Parties by Codexis and/or Shell for the purpose of the Research Plans.

1.20 "Research Committee," has the meaning set forth in Section 2.2(a).

1.21 "Research Plan," means a written plan to be agreed upon by the Parties describing activities to be carried out in connection with each work stream, which plan may be amended from time to time by agreement between the Parties. Each Research Plan, and any amendment thereto, shall be attached to this Amended and Restated Research Agreement as a schedule to Exhibit 1.21.

1.22 "Series D Stock Purchase Agreement" has the meaning set forth in Section 3.5(a).

1.23 "Series E Stock Purchase Agreement" has the meaning set forth in Section 3.5(b).

1.24 "Shell Technology" means any Technology that is or was (a) developed by employees of or consultants to Shell or an Affiliate of Shell, alone or jointly with Third Parties, prior to or during the Term outside the scope of activities described in any Research Plan; or (b) acquired during the Term by purchase, license, assignment or other means from Third Parties by Shell or an Affiliate of Shell, in each of case (a) or (b), introduced by Shell into the activities to be conducted under any Research Plan.

1.25 "Shuffling" means the characterization, development and optimization of genes and proteins for commercial uses through the recombination and/or rearrangement and/or mutation of genetic material for the creation of genetic diversity.

1.26 "Shuffling Technology" means any and all techniques, methodologies, processes, materials and/or instrumentation Controlled by Codexis, including without limitation any and all patent rights, know-how, confidential information and materials relating thereto, that, in each case, relates to Shuffling, and generally applicable screening techniques, methodologies, or processes of using the resulting genetic material to identify potential usefulness.

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1.27 "Technology" means and includes all materials, technology, technical information, intellectual property, know-how, expertise and trade secrets related to the Field of Use.

1.28 "Term" has the meaning set forth in Section 11.1.

1.29 "Third Party" means any party other than Codexis, Shell or Affiliates of either Pany.

1.30 "Warrant Agreement" has the meaning set forth in Section 8.2.

J.31 "Year Four Goal(s)" shall have the meaning set forth in Section 2.8(c).

1.32 "Year One Final Milestone" shall mean the achievement of the criteria set forth on Exhibit 1.32.

1.33 "Year Six Goal(s)" shall have the meaning set forth in Section 2.8(d).

ARTICLE 2

PROGRAM ACTIVITIES

2.1 Purpose. Codexis and Shell shall conduct the Program during the Term. The objective of the Program is to utilize Shuffling Technology to conduct research, and to discover and develop Biocatalysts, and associated processes for the use of such Biocatalysts, in the Field of Use, all as described in further detail in the Research Plans.

2.2 Research Committee.

(a) **Function.** Shell and Codexis shall establish a Research Committee (the "**Research Committee**") to:

(i) review the Research Plans as proposed by the Parties pursuant to Section 2.7, and to make recommendations to the Oversight Committee with respect to such proposed Research Plans;

(ii) review and evaluate progress under the Research Plans;

(iii) amend the Research Plans, as appropriate;

(iv) review annual milestones for activities to be carried out under each Research Plan by the Parties as defined and pursuant to Section 2.8(b), and to make recommendations to the Oversight Committee with respect to such proposed Milestones;

(v) review the Year Four Goal(s) proposed by the Parties pursuant to Section 2.8(c), and to make recommendations to the Oversight Committee with respect to such proposed Year Four Goal(s) on or before the May 1, 2009;

{*} **Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.**

(vi) review the Year Six Goal(s) proposed by the Parties pursuant to Section 2.8(d), and to make recommendations to the Oversight Committee with respect to such proposed Year Six Goal(s) on or before May 1, 2010;

(vii) make recommendations to the Oversight Committee with respect to whether Milestones for the activities to be carried out under each Research Plan, the Year Four Goal(s) and the Year Six Goal(s) have been achieved;

(viii) coordinate and monitor publication of research results obtained from, and the exchange of Information that relates to, the Program;

(ix) review and, if appropriate, investigate through appointment of a patent subcommittee or otherwise, at the election of the Research Committee, any issues that either Party may raise with respect to intellectual property rights of any Third Party directly relevant to the activities under the Research Plans and to make recommendations to the Parties regarding the appropriate action, if any, with respect thereto, including, for example, a recommendation to obtain a license from a Third Party. For purposes of clarification, each Party shall notify the other Party, through the Research Committee, of any and all intellectual property of a Third Party which the notifying Party believes is directly relevant to the activities under the Research Plans which such Party becomes aware during the Term; and

(x) provide a written meeting discussion summary to the Oversight Committee of each meeting of the Research Committee within ten (10) business days after each such meeting.

(b) Membership. Shell and Codexis each, in its sole discretion, shall appoint three (3) members to the Research Committee and shall provide written notice to the other Party of the names and contact information of such three (3) members within five (5) days after the Effective Date. Each Party may appoint substitutes for its members at any time, such substitution to be effective immediately upon providing the name and contact information of such substitute to the other Party's representatives on the Research Committee.

(c) Chair. The Research Committee shall be chaired by two (2) co-chairpersons, one appointed by Shell and one appointed by Codexis.

(d) Meetings. The Research Committee shall meet at least quarterly, at places and on dates selected in turn by each Party. Representatives of Shell or Codexis or both, in addition to members of the Research Committee, may attend such meetings at the invitation of either Party.

(e) Minutes. The Research Committee shall keep accurate written minutes of its deliberations that record all proposed decisions and all actions recommended or taken. Drafts of the minutes shall be delivered to all Research Committee members within ten (10) business days after each such meeting. The Party hosting the meeting shall be responsible for the preparation and circulation of the draft minutes. Draft minutes shall be edited within ten (10) business days after reception of the draft minutes by the co-chairpersons and shall be issued in final form only after each chairperson provides their respective approval and agreement. A final

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copy of the minutes shall be issued no later than thirty (30) business days after each respective meeting.

{t) Decisions.

(i) **Decision Making Process of the Research Committee.** All decisions of the Research Committee shall be made by unanimous vote or written consent, as indicated by both co-chairpersons of the Research Committee signing the final written minutes thereof. Codexis representatives collectively shall have one (1) vote and Shell representatives collectively shall have one (1) vote; provided, however, that in the case of a deadlock where unanimity has not been reached, the final decision with respect to matters concerning technical aspects within the scope of an approved Research Plan shall be made by Codexis; provided further, that the scope and goal(s) of such Research Plan, including (A) the annual Milestone(s) for such Research Plan, the Year Four Goal and the Year Six Goal, and (8) whether such Milestone(s), Year Four Goal and Year Six Goal have been achieved, shall never be considered "technical aspects." If a disagreement among members of the Research Committee with respect to matters other than "technical aspects" remains unresolved for more than thirty (30) business days after the Research Committee first addresses such matter (or such longer period as the Parties may mutually agree upon), such disagreement shall be submitted to the Oversight Committee for resolution. Notwithstanding anything to the contrary, the Research Committee shall have no authority to alter, modify or amend any of the rights and obligations of the Parties set forth under this Amended and Restated Research Agreement.

(ii) **Decision Making Process if the Research Committee is Disbanded.** If the Research Committee is disbanded pursuant to Section 2.2(h), then after such disbanding, decisions formerly within the jurisdiction of the Research Committee shall be submitted to the Oversight Committee for resolution. If the Oversight Committee has been disbanded pursuant to Section 2.3(h), then decisions shall be submitted to senior executive officers of each Party having authority to make decisions in such matters as designated by each Party in a written notice to the other Party ("**Executives**"), subject to the decision making processes and principles set forth in Section 2.3(f)(i) as if Section 2.3(f)(i) applied to decisions to be made by such Executives.

(g) **Expenses.** Shell and Codexis shall each bear all expenses of their respective members related to their participation on the Research Committee.

(h) **Disbanding of the Research Committee.** The Parties shall have the right to disband the Research Committee upon mutual agreement. Failure to agree to disband the Research Committee shall not constitute a breach of this Agreement, nor trigger the Dispute Resolution process as described in Section 12.7. The Research Committee shall be automatically disbanded upon the expiration or termination of the Agreement as set forth in Article 11.

2.3 Oversight Committee.

(a) **Function.** Shell and Codexis shall establish an Oversight Committee (the "**Oversight Committee**") to:

[•] Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission, Confidential treatment has been requested with respect to the omitted portions.

- (i) set priorities for the Parties' performance under the Program;
- (ii) review summaries of meetings and other reports of the Research Committee;
- (iii) review and approve recommendations from the Research Committee with respect to the Milestones for the activities to be carried out for each Research Plan, the Year Four Goal(s) and the Year Six Goal(s), and to approve such Milestones;
- (iv) determine whether Milestones for the activities to be carried out under each Research Plan, the Year Four Goal(s) and the Year Six Goal(s) have been achieved;
- (v) review, provide comment on, and approve Research Plans;
- (vi) review the activities and obligations of the Parties and the Research Committee under this Agreement;
- (vii) resolve any disputes or disagreements submitted to it by the Research Committee, and, if applicable, submit disputes or disagreements that it does not resolve within the time provided in Section 2.3(f)(i) to designated Executives of the Parties, as further described in Section 2.3(f)(i);
- (viii) review all material data arising in the course of activities conducted pursuant to this Amended and Restated Research Agreement by either Party;
- (ix) appoint subcommittees as it deems appropriate for carrying out the Program; and
- (x) perform such other functions as appropriate to further the purposes of this Amended and Restated Research Agreement as determined by the Parties, including without limitation the periodic evaluation of performance against goals.

(b) Membership. Shell and Codexis each, in its sole discretion, shall appoint three (3) members to the Oversight Committee and shall provide written notice to the other Party of the names and contact information of all such members within five (5) days after the Execution Date. Each Party may appoint substitutes for its members at any time, such substitution to be effective immediately upon providing the name and contact information of such substitute to the other Party's representatives on the Oversight Committee.

(c) Chair. The Oversight Committee shall be chaired by two (2) co-chairpersons, one appointed by Shell and one appointed by Codexis.

(d) Meetings. The Oversight Committee shall meet at least bi-annually, at places and on dates selected in turn by each Party. Representatives of Shell or Codexis or both, in addition to members of the Oversight Committee, may attend such meetings at the invitation of either Party.

•J Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

(e) Minutes. The Oversight Committee shall keep accurate written minutes of its deliberations that record all proposed decisions and all actions recommended or taken. Drafts of the minutes shall be delivered to all Oversight Committee members within ten (10) business days after each meeting. The Party hosting the meeting shall be responsible for the preparation and circulation of the draft minutes. Draft minutes shall be edited by the co-chairpersons and shall be issued in final form only after each chairperson provides their respective approval and agreement. A final copy of the minutes shall be issued within thirty (30) business days after each respective meeting.

(t) Decisions.

(i) Decision Making Process of the Oversight Committee. All decisions of the Oversight Committee shall be made by unanimous vote or written consent, as indicated by the co-chairpersons of the Oversight Committee signing the written minutes thereof, with Codexis representatives collectively having one (1) vote and Shell representatives collectively having one (1) vote; provided, however, that in the case of a deadlock where unanimity has not been reached, the final decisions shall be made by Shell except with respect to (A) the approval or modification of the annual Milestone(s) for each Research Plan, the Year Four Goal(s) or the Year Six Goal(s), (B) the approval or amendment of any Research Plan, (C) the determination as to whether Milestones for the activities to be carried out under each Research Plan, the Year Four Goal(s) or the Year Six Goal(s) have been achieved, (D) the acquisition of Third Party rights pursuant to Section 7.1, (E) the determination to have any party that is a Third Party as of the Execution Date participate in the activities to be conducted under the Program, (F) the introduction of Third Party Information into the Program, or (G) any decision that has a reasonable likelihood of having a material adverse impact on Codexis' business as conducted at the time of such decision or as contemplated to be conducted at the time of such decision. Notwithstanding anything to the contrary, except with respect to the approval of the Research Plans, the annual milestones for the activities carried out under each Research Plan, the Year Four Goal(s), the Year Six Goal(s), and any amendments to any of the foregoing, the Oversight Committee shall have no authority to alter, modify or amend any of the rights and obligations of the Parties set forth under this Amended and Restated Research Agreement. If the Oversight Committee is unable to resolve any dispute, controversy, or claim with respect to items (A) - (G) above in this Section 2.3(f)(i) within thirty (30) days after it first addresses such matter (or such longer period as the Parties may mutually agree upon), then the dispute shall be referred to Executives of each Party. For purposes of clarification, all matters related to "technical aspects" of an approved Research Plan shall be resolved in accordance with Section 2.2(f)(i).

(ii) Decision Making Process If the Oversight Committee is Disbanded. If the Oversight Committee is disbanded by mutual agreement of the Parties prior to the expiration or termination of the Agreement pursuant to Section 2.3(h), then after such disbanding, decisions formerly within the jurisdiction of the Oversight Committee shall be submitted for resolution by designated Executives of each Party, subject to the decision making processes and principles set forth in Section 2.3(f)(i) as if Section 2.3(f)(i) applied to decisions to be made by such Executives.

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{g} **Expenses.** Shell and Codexis shall each bear all expenses of their respective members related to their participation on the Oversight Committee.

(h) **Disbanding of the Oversight Committee.** The Parties shall have the right to disband the Oversight Committee upon mutual agreement. Failure to agree to disband the Oversight Committee shall not constitute a breach of this Agreement, nor trigger any Dispute Resolution process as described in Section 12.7. Additionally, the Oversight Committee shall be disbanded automatically upon the expiration or termination of the Agreement as set forth in Article 11.

2.4 Reports and Materials.

{a) Reports.

(i) During the Term, each Party shall provide to the Research Committee:

(1) summary written reports within thirty (30) days after the end of each three (3) month period commencing on the Effective Date, describing such Party's work and progress, if any, under the Research Plans;

(2) annual executive summaries within thirty (30) days after each anniversary of the Effective Date for each Research Plan for which work was performed during the relevant Contract Year;

(3) a comprehensive written report within thirty (30) days after completion of all work under each Research Plan, describing in detail the work accomplished by it under such Research Plan and discussing and evaluating the results of such work; and

(4) a comprehensive written report within thirty (30) days after the end of the Term, describing in detail the work accomplished by it under the Research Plans during the Term and discussing and evaluating the results of such work.

(ii) During the Term, the Research Committee shall provide a written meeting discussion summary report to the Oversight Committee of each meeting of the Research Committee within ten (10) business days after each such meeting.

(iii) Any report delivered to a Party hereunder shall be owned by the delivering Party; provided, however, all such reports shall be deemed to be Confidential Information of both Parties for purposes of Article 6.

(b) **Materials.** Codexis and Shell shall, during the Term, as a matter of course as described in the Research Plans, or upon each other's written or oral request, furnish to each other samples of biochemical, biological or synthetic chemical materials which are part of Shell Technology, Codexis Technology or Program Technology which are necessary for each Party to carry out its responsibilities under the Research Plans.

(*] Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions

2.5 Laboratory Facility and Personnel.

(a) Codexis shall provide suitable laboratory facilities, equipment and personnel for the work to be done by Codexis in carrying out the Research Plans. For purposes of clarification, except as set forth in Section 2.5(b) below, all fees and payments due to Codexis hereunder for the provision of laboratory facilities, equipment and personnel are set forth in Article 3 below.

(b) Shell shall be responsible, at Shell's sole cost and expense, for providing suitable laboratory facilities, equipment and personnel for the work to be done by Shell at Shell facilities, if any, in carrying out the Research Plans; provided that from time to time during the Term after the second (2nd) anniversary of the Effective Date, upon the written agreement of the Parties, Codexis shall make commercially reasonable efforts to accommodate no more than four

(4) Shell employees at Codexis' facilities in Redwood City, California, for periods of up to six (6) months, at Shell's sole cost and expense, in order to permit such Shell employees to carry out activities under the Research Plans; provided further, that any such Shell employee shall first execute a confidentiality agreement with Codexis acceptable to Shell and to Codexis prohibiting such Shell employee from using or disclosing confidential information of Codexis for any purpose other than as necessary to carry out activities under the Research Plans (such limitations on use and disclosure to include without limitation disclosure to or use for the benefit of Shell or any Shell Affiliate); provided further that Shell shall agree to serve as a surety as to, and with respect to any damages suffered by Codexis or its Affiliates as a result of the breach of the non-use and non-disclosure restrictions set forth in such confidentiality agreement by such Shell employee, including without limitation any breach that may occur after such Shell employee is no longer an employee of Shell; provided further that in a circumstance of a former employee of Shell, Codexis shall first pursue its full legal rights against such former employee and/or Third Party that caused any such damages to Codexis, before Codexis seeks any relief from Shell but, thereafter, will not be required to reassert against Shell any claim or demand previously asserted against such former employee and/or such Third Party that, in such previous action, was resolved in favor of Codexis.

2.6 Efforts.

(a) Each Party shall use commercially reasonable efforts during the Term to perform that part of the Program for which such Party is responsible pursuant to the terms and conditions of this Amended and Restated Research Agreement, and to complete such tasks in compliance with the schedule set forth in the applicable Research Plan.

(b) FTEs.

(i) Beginning on the Effective Date and ending on March 31, 2007, Codexis shall assign **[eight (8)]** FTEs to perform Codexis' obligations under the Program, and to complete the tasks assigned to Codexis in the Research *Plan* for such period. The Parties acknowledge and agree that as of the Execution Date, Codexis has fulfilled its obligations under this Section 2.6(b)(i).

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(ii) Beginning on April 1, 2007 and ending on October 31, 2007, Codexis shall assign **[twelve (12)]** FfEs to perform Codexis' obligations under the Program, and to complete the tasks assigned to Codexis in the Research Plan for such period. The Parties acknowledge and agree that as of the Execution Date, Codexis has fulfilled its obligations under this Section 2.6(b)(ii) for the period beginning on April 1, 2007 and ending on the Execution Date.

(iii) Subject to Section 2.6(c), after the first anniversary of the Effective Date, during the Term, Codexis shall assign, on or before the dates set forth in the table in this Section 2.6(b)(iii), below, no less than the corresponding number of FTEs set forth in the table in this Section 2.6(b)(iii), below, to perform Codexis' obligations under the Program, and to complete the tasks assigned to Codexis in the Research Plans.

Total Number of FTEs	<u>Date</u>
[24]	November 1, 2007
(48)	April 1, 2008
[72]	August 1, 2008

Notwithstanding the foregoing, either Party, upon not less than thirty (30) days prior written notice, may extend, by up to sixty (60) days, the dates set forth under the heading "Date" in the table above in this Section 2.6(b)(iii); provided, however, that under no circumstances will the total delay of any such date be greater than sixty (60) days, whether the delay is requested by Shell, Codexis, or both.

(iv) In the event that Codexis has resources available to dedicate to an approved Research Plan in advance of the schedule set forth in Section 2.6(b)(iii), Codexis shall allocate such resources to the Program upon thirty (30) days advance written notice to Shell.

(c) Reduction in FTEs.

(i) During the period beginning on August 1, 2008 and ending on the third (3rd) anniversary of the Effective Date, Shell shall have the right to reduce the total number of FTEs assigned by Codexis to perform Codexis' obligations under the Program by up to **[twelve (12)]** FfEs upon sixty (60) days advance notice.

(ii) After the third (3rd) anniversary of the Effective Date, Shell shall have the right to reduce the total number of FfEs assigned by Codexis to perform Codexis' obligations under the Program upon advance notice; provided, however, that the number of FfEs that may be reduced will not be greater than as set forth in, and implemented after written notice thereof in accordance with, the table in this Section 2.6(c)(ii), below; provided, further, however, that no reductions may be noticed during the applicable standstill period set forth in this Section

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2.6(c)(ii), below, immediately after an FfE reduction already noticed (each such period during which no subsequent notice may be given, a **Standstill Period**).

Number of FTEs that May Be Reduced	Standstill Period	Advance Notice Required
12)	[90 days]	[30 days]
[13 - 48)	[180 days]	[90 days]
[> 48]	[360 days]	[180 days]

By way of example, if Shell elects to reduce the number of FfEs by **[twelve (12)]** FfEs or less, no additional reductions may be made by Shell during the **[ninety (90)]** day Standstill Period beginning on the date of advance written notice of such reduction election. Similarly, if Shell elects to reduce the number of FTEs by more than **[twelve (12)]** FfEs but less than or equal to **[forty-eight (48)]** FfEs, no additional reductions may be made by Shell during the **[one hundred eighty (180)]** day Standstill Period beginning on the date of advance written notice of such reduction election.

2.7 Approval of Research Plans. Prior to beginning work, Codexis shall provide a proposed Research Plan to Shell for each work stream. Shell may comment on, and may make recommendations to, such proposed Research Plan from Codexis. The Parties shall submit such proposed Research Plan to the Research Committee for consideration and recommendation to the Oversight Committee for approval.

2.8 Milestones.

(a) **Year One Final Milestone.** Shell acknowledges that, as of the Execution Date, Codexis has achieved the Year One Final Milestone.

(b) **Annual Milestones.** Prior to beginning work, Codexis shall provide a proposal to Shell for annual milestones for each work stream. The Parties shall submit such proposed milestones to the Research Committee for consideration and recommendation to the Oversight Committee for approval.

(c) **Year Four Goal(s).** Unless otherwise agreed by the Parties in writing, prior to March 1, 2009, Codexis shall provide a proposal to Shell for Program progress goal(s) to be achieved as of the fourth (4th) anniversary of the Effective Date (the **"Year Four Goal(s)"**). The Parties shall submit such proposed Year Four Goal(s) to the Research Committee for consideration and recommendation to the Oversight Committee for approval. For purposes of clarification, it is the intent of the Parties that the Year Four Goal(s) will be more technically challenging to achieve than the annual Milestones established in accordance with Section 2.8(b).

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(d) **Year Six Goal(s).** Unless otherwise agreed by the Parties in writing, prior to March 1, 2010, Codexis shall provide a proposal to Shell for Program progress goal(s) to be achieved as of the sixth (6th) anniversary of the Effective Date (the "**Year Six Goal(s)**"). The Parties shall submit such proposed Year Six Goal(s) to the Research Committee for consideration and recommendation to the Oversight Committee for approval. For purposes of clarification, it is the intent of the Parties that the Year Six Goal(s) will be more technically challenging to achieve than the annual Milestones established in accordance with Section 2.8(b).

(e) **Milestone Verification.**

(i) In the event that Codexis reasonably believes that it has achieved a particular annual Milestone, the Year Four Goal(s) or the Year Six Goal(s), Codexis shall deliver written notice thereof to Shell (each such notice, a "**Milestone Notice**"). Within ten (10) business days after delivery of a particular Milestone Notice, Codexis shall provide to Shell sufficient quantities of any relevant Biocatalyst to permit Shell to verify that the annual Milestone, Year Four Goal(s) or Year Six Goal(s), as the case may be, in such Milestone Notice has been achieved.

(ii) In the event that Shell cannot verify Codexis' assertion that Codexis has achieved the annual Milestone, Year Four Goal(s) or Year Six Goal(s), as the case may be, identified in a particular Milestone Notice, Shell shall provide written notice thereof to Codexis (each such notice, a "**Nonreplication Notice**"). The annual Milestone, Year Four Goal(s) or **Year Six Goal(s)**, as the case may be, identified in each Milestone Notice shall be deemed to have been achieved unless Shell provides a Nonreplication Notice within ninety (90) days after Shell's receipt of such Milestone Notice; provided that upon written notice provided prior to the expiration of such ninety (90) day period, Shell may seek an extension of such ninety (90) day period of up to forty-five (45) days to provide such Nonreplication Notice, not to be unreasonably withheld by Codexis. Upon Codexis' receipt of a Nonreplication Notice, the Parties will determine a mutually agreeable time to perform the applicable tests necessary to replicate the identified annual asserted Milestone, Year Four Goal(s) or Year Six Goal(s), as the case may be, that is the subject of such Nonreplication Notice, such tests to be performed, at Shell's sole option and expense (1) by Shell at a Shell facility, with Codexis observing; (2) by Codexis at a Codexis facility, with Shell observing or (3) by a mutually agreeable Third Party at such Third Party's facilities, with both Codexis and Shell observing. The outcome of such test shall be determinative of whether the annual Milestone, Year Four Goal(s) or Year Six Goal(s), as the case may be, has been achieved. In the event that Shell elects to have such test performed by a mutually agreeable Third Party, Codexis shall first execute a sponsored research agreement with such Third Party substantially in the form attached hereto as Exhibit 2.8(e)(ii).

ARTICLE 3

FEES AND PAYMENTS

3.1 Codexis Technology Access Fee. In consideration of the use of Codexis' Technology and Codexis' related technical knowledge and expertise during the first (1st) Contract Year of the Term, Shell shall pay to Codexis a non-refundable, non-creditable technology access fee of Two Million Eight Hundred Thousand United States Dollars [•] **Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.**

(\$2,800,000) on the Effective Date. The Parties acknowledge and agree that, as of the Execution Date, such technology access fee has been fully (a) earned by Codexis and (b) paid by Shell.

3.2 Exclusivity Fee. During the Term, Codexis (a) will act exclusively with Shell regarding the rights and research described herein; and (b) will not (i) conduct research, discover or develop Biocatalysts, and associated processes for the use of such Biocatalysts, in the Field of Use for any other party or (ii) enter into any other agreements to conduct research, discover or develop Biocatalysts, and associated processes for the use of such Biocatalysts, in the Field of Use (including without limitation any agreement to convert Biomass to fermentable sugars unless such other party has provided express assurance in a written agreement that such fermentable sugars shall be used only outside the Field of Use), as more fully described with respect to both (a) and (b) in this Amended and Restated Research Agreement and pursuant to the covenant in Section 9.3. In consideration of such research activities performed exclusively for Shell in the Field of Use, Shell shall pay to Codexis an exclusivity fee of Twenty Million United States Dollars (\$20,000,000) on the Execution Date. Except as expressly provided in Section 11.4(a), such exclusivity fee shall be non-refundable and non-creditable. For purposes of clarification, Shell acknowledges and agrees that such covenant regarding such exclusivity shall expire upon termination or expiration of this Agreement: provided that in the event of any Renewal Term in accordance with Section 11.1, Shell shall not be required to pay any additional exclusivity fee beyond that set forth in this Section 3.2 in order to maintain the research exclusivity as described herein and in Section 9.3 for the duration of this Agreement, including during the Initial Term and any such Renewal Term.

3.3 FTE Payments.

(a) First Contract Year. During the first (1st) Contract Year of the Term, Shell shall pay to Codexis a research funding fee based on an FTE rate equal to **[Four Hundred Thousand United States Dollars (\$400,000)]** per year for each of the FTEs assigned by Codexis to perform Codexis' obligations under the Program during such first (1st) Contract Year. Such FTE rate includes any and all associated overhead expenses, normal laboratory supplies and consumables expenses, and typical operational research expenses. The Parties acknowledge and agree that, as of the Execution Date, the FTE payments for the first (1st) Contract Year of the Term have been paid by Shell.

(b) After the First Contract Year. During the second (2nd) Contract Year of the Term, Shell shall pay to Codexis a research funding fee based on an FTE rate equal to **[Four Hundred Twenty Thousand United States Dollars (\$420,000)]** per year for each of the FTEs assigned by Codexis to perform Codexis' obligations under the Program during the second (2nd) Contract Year of the Term. Such FTE rate shall be increased annually at the beginning of each subsequent Contract Year of the Term by an amount equal to **[five percent (5%)]** of the FTE rate for the preceding Contract Year. Such FTE rate includes any and all associated overhead expenses, normal laboratory supplies and consumables expenses, and typical operational research expenses. Such FTE payments in each Contract Year shall be made in six (6) equal installments (each an **"FTE Installment"**), each in advance of work actually performed based on the planned utilization of FTEs for the following two (2) months; provided, however, that, in the event either Party elects to reduce the number of FTEs working on the Program pursuant to

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Section 2.6(c), a corresponding reduction will be made to the amount of the next FTE Installment. In the event that Codexis dedicates FTEs to the Program in advance of the schedule set forth in Section 2.6(b)(iii) in accordance with Section 2.6(b)(iv), Shell shall make an additional payment to Codexis on or before the date such increase shall become effective, which amount shall be equal to (i) the then-current FTE rate, times (ii) the number of additional FTEs, times (iii) the number of days until the date on which the next FTE Installment is required to be paid pursuant to this Section 3.3(b), above, divided by (iv) three hundred sixty-five (365).

3.4 Milestone Payments.

(a) Shell shall pay to Codexis a one-time, non-refundable, non-creditable milestone payment equal to **[One Million United States Dollars (\$1,000,000)]** within thirty (30) days after the receipt by Shell of the report due from Codexis at six (6) months after the Effective Date, as provided in Section 2.4(a)(i)(1). The Parties acknowledge and agree that, as of the Execution Date, such Milestone payment has been fully (i) earned by Codexis and (ii) paid by Shell.

(b) For each Contract Year during the Initial Term beginning with the third (3rd) Contract Year, Shell shall pay to Codexis a non-refundable, non-creditable Milestone payment equal to **[Two Million Five Hundred Thousand United States Dollars (\$2,500,000)]** (for a total of **[Ten Million United States Dollars (\$10,000,000)]**) upon achievement of the Milestones for each of the then-current Research Plans established in accordance with Section 2.8(b), such amount to be distributed equally among all such then-current Research Plans. By way of example, if there are five (5) Research Plans in a Contract Year and Codexis achieves the Milestone established for each of three (3) of the five (5) Research Plans before the end of such Contract Year, Shell shall pay to Codexis a payment equal to **[One Million Five Hundred Thousand United States Dollars (\$1,500,000)]** for that Contract Year; provided that, if Codexis achieves the Milestones established for the fourth (4th) or fifth (5th) Research Plans after such Contract Year and before the three (3) month anniversary or the expiration of such Contract Year, Shell shall pay Codexis a payment equal to **[Five Hundred Thousand United States Dollars (\$500,000)]** for each such Milestone after such Milestone has been achieved. For purposes of clarification, for purposes of this Section 3.4(b), "achievement of the applicable Milestone" means that Codexis delivers to Shell a Milestone Notice for such Milestone within the relevant time period, even if the verification of such Milestone Notice occurs after the expiration of such time period; provided, however, that payment for any Milestone due pursuant to this Section 3.4(b) will be due and payable in accordance with Section 3.6 only after the achievement of such Milestone has been verified in accordance with Section 2.8(e).

(c) Upon the achievement of the Year Four Goal(s), Shell shall pay to Codexis a one-time, non-refundable, non-creditable Milestone payment equal to **[Five Million United States Dollars (\$5,000,000)]**; provided, however, that payment for the Year Four Goal(s) due pursuant to this Section 3.4(c) will be due and payable in accordance with Section 3.6 only after the achievement of such Year Four Goal(s) has been verified in accordance with Section 2.8(c).

(d) Upon the achievement of the Year Six Goal(s), Shell shall pay to Codexis a one-time, non-refundable, non-creditable Milestone payment equal to **[Five Million Dollars]**

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(\$5,000,000)]; provided, however, that payment for the Year Six Goal(s) shall be due pursuant to this Section 3.4(d) will be due and payable in accordance with Section 3.6 only after the achievement of such Year Six Goal(s) has been verified in accordance with Section 2.8(e).

(e) For each Contract Year, if any, of (i) the Initial Term beyond the sixth (6th) Contract Year in the event that the Parties agree to extend the Initial Term beyond the six (6) year anniversary of the Effective Date in accordance with Section 1.1.1. and (ii) each Renewal Term, Shell shall pay to Codexis a non-refundable, non-creditable Milestone payment equal to **(Two Million Five Hundred Thousand United States Dollars (\$2,500,000))** upon achievement of the Milestones for each of the then-current Research Plans established in accordance with Section 2.8(b), such amount to be distributed equally among all then-current Research Plans. By way of example, if there are five (5) Research Plans in a Contract Year and Codexis achieves the Milestone established for each of three (3) of the five (5) Research Plans before the end of such Contract Year, Shell shall pay to Codexis a payment equal to **[One Million Five Hundred Thousand United States Dollars (\$1,500,000)]** for that Contract Year; provided that, if Codexis achieves the Milestones established for the fourth (4th) or fifth (5th) Research Plans after such Contract Year and before the expiration of this Agreement, Shell shall pay Codexis a payment equal to **[Five Hundred Thousand United States Dollars (\$500,000)]** for each such Milestone after such Milestone has been achieved. For purposes of clarification, for purposes of this Section 3.4(e), "achievement of the applicable Milestone" means that Codexis delivers to Shell a Milestone Notice for such Milestone within the relevant time period, even if the verification of such Milestone Notice occurs after the expiration of such time period; provided, however, that payment for any such Milestone due pursuant to this Section 3.4(e) will be due and payable in accordance with Section 3.6 only after the achievement of such Milestone has been verified in accordance with Section 2.8(e).

3.5 Equity Payments.

(a) **Series D Stock Purchase Agreement.** Upon the Effective Date, Shell shall purchase Three Million United States Dollars (\$3,000,000) of Series D Preferred Stock of Codexis, pursuant to the terms and conditions of a stock purchase agreement in the form attached hereto as Schedule A, appended to and made part of this Amended and Restated Research Agreement, (the "**Series D Stock Purchase Agreement**") at Three United States Dollars and Ninety-Seven Cents (\$3.97) per share. The Parties acknowledge and agree that, as of the Execution Date, such Series D Preferred Stock has been (i) issued to Shell by Codexis and (ii) paid for in full by Shell.

(b) **Series E Stock Purchase Agreement.** On or before the Execution Date, Shell shall purchase a sufficient number of shares of Series E Preferred Stock of Codexis, pursuant to the terms and conditions of a stock purchase agreement substantially in the form attached hereto as Schedule B, appended to and made part of this Amended and Restated Research Agreement, (the "**Series E Stock Purchase Agreement**") at Eight United States Dollars and Fifty Cents (\$8.50) per share, such that immediately after such purchase, Shell shall own ten percent (10.0%) of the equity securities of Codexis on a fully diluted basis; provided that at each Subsequent Closing (as defined in the Series E Stock Purchase Agreement), if any, Shell shall purchase an additional number of shares of Series E Preferred Stock such that

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immediately after each such Subsequent Closing Shell shall own ten percent (10.0%) of the equity securities of Codexis on a fully diluted basis. Notwithstanding anything to the contrary, the Parties acknowledge and agree that the maximum amount that Shell shall be required to invest under the Series E Stock Purchase Agreement shall be Thirty Million Seven Hundred Three Thousand Five Hundred Sixty-Four United States Dollars (\$30,703,564). For purposes of this Section 3.5(b) only, "fully diluted basis" means all shares of Codexis common stock then outstanding, assuming full exercise and/or conversion of all outstanding Codexis securities exercisable and/or convertible into Codexis common stock and including shares reserved for issuance in connection with options not yet granted under any Codexis equity incentive plan.

(c) On or before the Execution Date, Shell will exercise, in full, the Warrant Agreement.

3.6 Mode of Payment. All payments made pursuant to this Amended and Restated Research Agreement, other than those due on the Execution Date or the Effective Date or under Section 5.2, shall be due and payable within sixty (60) days following receipt by Shell of a relevant invoice from Codexis. Such payments shall be made by direct wire transfer of United States Dollars in immediately available funds in the requisite amount to such bank account as Codexis may from time to time designate by written notice to Shell. Payments will be free and clear of any taxes (and net of any withholding and other taxes imposed on the payee), fees or charges, to the extent applicable.

3.7 Late Payment Interest. Any payment due and payable to Codexis under the terms and conditions of Section 3.3, 3.4, or 5.2 made by Shell later than sixty (60) days after the date such payment is due and payable shall bear interest as of the day after the date such payment was due and payable and shall continue to accrue such interest until such payment is made at a rate equal to the lesser of either (a) two percent (2%) above the prime rate as reported by Citibank, New York, New York, as of the date such payment was due and payable, or (b) the maximum rate permitted by applicable law. The Parties acknowledge and agree that, as of the Execution Date, there are no outstanding late payments due to Codexis that would be subject to interest payments pursuant to this Section 3.7.

ARTICLE 4

INTELLECTUAL PROPERTY RIGHTS

4.1 Ownership.

(a) **Shell Technology.** Subject to the rights expressly granted to Codexis under the terms and conditions of this Amended and Restated Research Agreement and the Amended and Restated License Agreement, Shell or its Affiliates owns or otherwise controls and shall own or otherwise control all right, title and interest in, to and under any and all Shell Technology.

(b) **Codexis Technology.** Subject to the rights expressly granted to Shell under the terms and conditions of this Amended and Restated Research Agreement and the

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Amended and Restated License Agreement, Codexis owns or otherwise controls and shall own or otherwise control all right, title and interest in, to and under any and all Codexis Technology.

(c) **Program Technology.** Subject to the rights expressly granted to Shell under the terms and conditions of this Amended and Restated Research Agreement and the Amended and Restated License Agreement, Codexis owns or otherwise controls and shall own or otherwise control all right, title and interest in, to and under any and all Program Technology.

4.2 Grant of Research Licenses.

(a) Codexis grants to Shell a non-exclusive, irrevocable, worldwide, royalty-free license, including the right to grant sublicenses to its Affiliates, to make and use Codexis Technology and Program Technology solely to conduct activities in accordance with Shell's responsibilities, to be articulated under each Research Plan; provided, however, that this license does not include and Shell shall not acquire, by virtue of this license, any rights in, to or under the Shuffling Technology.

(b) Shell grants to Codexis a non-exclusive, irrevocable, worldwide, royalty-free license, including the right to grant sublicenses to its Affiliates, to make and use Shell Technology solely to conduct activities in accordance with Codexis' responsibilities, to be articulated under each Research Plan.

4.3 Limitation. Except as expressly provided in this Amended and Restated Research Agreement and the Amended and Restated License Agreement, no right, title or interest is granted by either Party to the other Party.

ARTICLES

PATENT PROSECUTION AND MAINTENANCE

5.1 Filing, Prosecution and Maintenance by Codexis. With respect to the Program Patent Rights arising from the Program, Codexis shall have the right, but not an obligation to:

(a) file applications for letters patent on any invention included in such Patent Rights;

(b) take all reasonable steps to prosecute all pending and new patent applications included within such Program Technology;

(c) respond to oppositions, nullity actions, re-examinations, revocation actions and similar proceedings filed by Third Parties against the grant of letters patent for such applications; and

(d) maintain in force any letters patent included in such Patent Rights by duly filing all necessary papers and paying any fees required by the patent laws of the particular country in which such letters patent were granted.

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In addition, Codexis shall have the right, but not the obligation, to initiate and prosecute oppositions, nullity actions, re-examinations, revocation actions and similar proceedings against the grant of letters patent owned by Third Parties that may limit the ability of the Parties to exploit the Program Technology.

Notwithstanding the foregoing, Codexis shall consult with Shell regarding countries -in which such patent applications or issued patents, as applicable, should be filed, prosecuted, and/or maintained. If Codexis agrees to file, prosecute, and/or maintain such patent applications or issued patents, as applicable, Codexis shall do so as set forth in this Section 5.1, above, in those countries where Shell requests that Codexis file, prosecute, and/or maintain such applications; provided that Codexis, at its option and exercise, may file, prosecute, and/or maintain applications in countries where Shell does not request that Codexis file, prosecute, and/or maintain such applications. If Codexis does not agree to file, prosecute, and/or maintain such patent applications or issued patents, as applicable, Codexis shall provide Shell with written notice of any decision to not file a patent application or to abandon a pending application or an issued patent included in such Patent Rights, such notice to be delivered at least thirty (30) days prior to any action required to obtain or maintain such pending application or such issued patent, as the case may be. Thereafter, Shell shall have the option, at its expense, of filing such an application, or continuing to prosecute any such pending patent application or of keeping the issued patent in force, as applicable. In the event that Shell exercises such option for any such pending application or such issued patent, Codexis shall assign to Shell such pending application or such issued patent, as the case may be. Codexis shall cooperate fully with, and take all necessary actions requested by, Shell in connection with the preparation, prosecution and maintenance of any such letters patent included in such Patent Rights.

5.2 Reimbursement of Costs for Filing, Prosecuting and Maintaining Patent Rights. Within thirty (30) days after receipt of an invoice from Codexis, Shell shall reimburse Codexis for a portion of the costs of (a) filing, prosecuting, responding to opposition and maintaining patent applications and patents in countries where Shell requests that patent applications be filed, prosecuted and maintained, and (b) filing, prosecuting, and responding to oppositions, nullity actions, re-examinations, revocation actions and similar proceedings against the grant of letters patent owned by Third Parties that may limit the ability of the Parties to exploit the Program Technology. Such reimbursement shall equal fifty percent (50%) of such costs actually incurred in the United States, Europe, Argentina, Australia, Brazil, China, India, Japan, Singapore, South Korea and Turkey, and one hundred percent (100%) of such costs elsewhere, and in each case, shall be in addition to payments under Article 3. However, Shell may, upon sixty (60) days notice, request that Codexis discontinue filing or prosecution of patent applications in any country and shall have no obligation after the effective date of such notice to reimburse Codexis for the costs of filing, prosecuting, responding to opposition or maintaining such patent application or patent in such country. Codexis shall pay all costs in those countries in which Shell does not request that Codexis file, prosecute or maintain patent applications and patents, but in which Codexis, at its option, elects to do so.

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ARTICLE6

CONFIDENTIALITY

6.1 Confidentiality Obligations. The Parties agree that, during the Term and for five (5) years thereafter, al) Confidential Information disclosed by one Party to the other Party hereunder shall be received and maintained by the receiving Party in strict confidence, shall not be used for any purpose other than the purposes expressly permitted by this Amended and Restated Research Agreement, and shall not be disclosed to any Third Party. The Parties acknowledge and agree that the structure and composition of each particular Biocatalyst developed under the Program shall be deemed Confidential Information of Codexis, subject to the confidentiality and non-use obligations set forth in this Article 6. Shell shall limit the disclosure of Third Party Information to Codexis to that required for the Program. No Third Party Information shall be disclosed until (i) Shell has described the general nature and scope of the information to be disclosed and the terms and conditions attaching to disclosure and use; and (iii) Codexis has agreed to receive such _information in confidence under such terms and conditions. The obligations of confidentiality and non-use set forth in the first sentence of this Section 6.1 will not apply to any information to the extent that it can be established by the receiving Party thatsuch information:

(a) was already known to the receiving Party or its Affiliates at the time of disclosure without restriction as to confidentiality or use, as evidenced by competent evidence;

(b) was generally available to the public or was otherwise part of the public domain at the time of its disclosure to the receiving Party or its Affiliates;

(c) became generally available to the public or otherwise becomes part of the public domain after its disclosure and other than through any fault of the receiving Party or its Affiliates in breach of this Amended and Restated Research Agreement;

{d) was subsequently lawfully disclosed to the receiving Party or its Affiliates by a Third Party without restriction as to confidentiality or use and other than in contravention of a confidentiality obligation of such Third Party to the disclosing Party or its Affiliates; or

(e) is independently developed by employees or agents of the receiving Party or its Affiliates without reliance upon or access to Confidential Information of the disclosing Party or its Affiliates, as evidenced by competent evidence.

Each Party represents and warrants that it has or will obtain written agreements from each of its consultants who perform work on the Program or otherwise have a need to know the other Party's Confidential Information, which agreements will obligate such persons to obligations of confidentiality and non-use no less restrictive than those assumed by the Parties herein, and to assign to such Party all inventions made by such persons during the course of performing any tasks associated with the Program. Further, each Party represents and warrants that those of its employees which perform work on the Program or otherwise have a need to know the other Party's Confidential Information are bound by obligations of confidentiality and non-use to the employer Party, Either Party may disclose Confidential Information of the other Party to such

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Party's Affiliates. provided that any such Affiliate agrees prior to such disclosure to be bound by obligations of confidentiality and non-use no less restrictive than those assumed by such disclosing Party herein.

Notwithstanding this Article 6 the receiving Party may disclose any Confidential Information of the disclosing Party that the receiving Party is required to disclose under applicable laws or regulations or an order by a court or other regulatory body having competent jurisdiction; provided, however, that except where impracticable, the receiving Party shall give the disclosing Party reasonable advance notice of such disclosure requirement (which shall include a copy of any applicable subpoena or order) and shall afford the disclosing Party a reasonable opportunity to oppose, limit or secure confidential treatment for such required disclosure. In the event of any such required disclosure, the receiving Party shall disclose only that portion of the Confidential Information of the disclosing Party that the receiving Party is legally required to disclose and, in the event a protective order is obtained by the disclosing Party, nothing in this Article 6 shall be construed to authorize the receiving Party to use or disclose any disclosing Party Confidential Information to parties other than such court or regulatory body or beyond the scope of the protective order. Codexis and its Affiliates may disclose this Amended and Restated Research Agreement if required to be disclosed by applicable State or federal tax or securities laws to the extent, and only to the extent, such laws require such disclosure and Codexis provides Shell a reasonable opportunity to review and comment on the general text of such disclosure.

6.2 Press Releases. Except to the extent required by law or regulation or as otherwise permitted in accordance with this Section 6.2, no Party shall make any public announcements concerning this Amended and Restated Research Agreement or the terms hereof without the prior written consent of the other Party and the Parties shall agree on the content and timing of any such public announcement. Notwithstanding the foregoing, the Parties will issue a mutually acceptable joint press release within sixty (60) days after the first anniversary of the Effective Date.

ARTICLE 7

ACQUISITION OF RIGHTS FROM THIRD PARTIES

7.1 Acquisition of Rights from Third Parties. In the event that during the Term, either Party makes a determination that there may be an opportunity to acquire technology or patents or information from a Third Party that may be useful in the Program (collectively, the "**Acquired Technology**"), such Party, at its sole discretion, will notify the other Party thereof through the Research Committee. Codexis and Shell shall decide, considering the recommendations of the Research Committee and the Oversight Committee, if such rights of a Third Party should be acquired in connection with the Program and, if so, whether by Codexis, Shell or both. If acquired, such rights shall become part of the Confidential Information, Technology or Patent Rights, whichever is appropriate, of the acquiring Party or Parties. Notwithstanding anything to the contrary, the decision to acquire such rights shall not be considered a "technical aspect" for purposes of section 2.2(t) of this Restated and Amended Research Agreement.

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7.2 Payment. (Shell shall reimburse Codexis for payments owed by Codexis to any Third Party in connection with any agreed acquisition of Acquired Technology pursuant to Section 7.1; provided that, if Codexis uses or intends to use such Acquired Technology for purposes outside the Field of Use, the Parties shall first agree on the proportion of such payments to be reimbursed by Shell for the use of such Acquired Technology in the Field of Use].

ARTICLE 5

OTHER AGREEMENTS

8.1 Amended and Restated License Agreement. Concurrently with the execution of this Amended and Restated Research Agreement, Codexis and Shell shall enter into the Amended and Restated License Agreement substantially in the form attached hereto as Schedule E, appended to and made part of this Amended and Restated Research Agreement.

8.2 Issuance of Warrants. On the Effective Date, Codexis issued a warrant agreement as attached hereto as Schedule D, and appended to and made part of this Amended and Restated Research Agreement (the "**Warrant Agreement**"), wherein Codexis agreed to issue warrants for the purchase of Three Million United States Dollars (\$3,000,000) of preferred stock by Shell at the following price per share, as more fully set forth in the Warrant Agreement:

(a) In the event that Codexis fails to achieve the Year One Final Milestone, the purchase price per share shall equal Three United States Dollars and Ninety-Seven Cents (\$3.97); and

(b) In the event that Codexis achieves the Year One Final Milestone, the purchase price per share shall equal Seven United States Dollars (\$7.00).

Notwithstanding anything to the contrary, Shell acknowledges that the Year One Final Milestone has been achieved for purposes of this Section 8.2(b). On or before the Execution Date, Shell will exercise, in full, the Warrant Agreement.

8.3 Entire Agreement. This Amended and Restated Research Agreement, the Amended and Restated License Agreement, the Series D Stock Purchase Agreement, and the Series E Stock Purchase Agreement are the sole agreements with respect to the subject matter hereof and supersede all other prior and contemporaneous agreements and understandings between the Parties with respect to same, including without limitation the certain Non-Binding Term Sheet by and between Codexis and Shell dated as of August 23, 2006, that certain Collaborative Research Agreement by and between Codexis and Shell effective as of November 1, 2006, as amended, and that certain License Agreement by and between Codexis and Shell effective as of November 1, 2006.

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ARTICLE9

REPRESENTATIONS AND WARRANTIES

9.1 Representations by Codexis. Codexis represents and warrants that, as of the Execution Date: (a) it is duly organized and validly existing under the laws of the jurisdiction of its incorporation and has full corporate power and authority to enter into this Amended and Restated Research Agreement; (b) it is in good standing with all relevant governmental authorities; (c) it has taken all corporate actions necessary to authorize the execution and delivery of this Amended and Restated Research Agreement and the performance of its obligations under this Amended and Restated Research Agreement; (d) the performance of its obligations under this Amended and Restated Research Agreement do not conflict with, or constitute a default *under* its charter documents, any contractual obligation of Codexis or any court order; (e) it Controls the Codexis Technology and it has the right to make the grants set forth in this Amended and Restated Research Agreement; (f) it is not aware of, and has not been served with, any suit or action pending in any court against Codexis, alleging patent infringement based on the use of Codexis Technology by Codexis or any Affiliate or licensee of Codexis, and Codexis has not received any communications or notice alleging any such patent infringement; and (g) it has not (i) provided any Third Party, including the United States government or agency thereof, any claim to rights relating to the Codexis Technology or the Program Technology, or (ii) entered into any agreements, commitments or other arrangement with any Third Party, including the United States government or agency thereof, in each case that would (1) prohibit Codexis from fulfilling its obligations hereunder or (2) be inconsistent or in conflict with the rights granted to Shell hereunder.

9.2 Representations by Shell. Shell represents and warrants that, as of the Execution Date: (a) it is duly organized and validly existing under the laws of the jurisdiction of its formation and has full corporate power and authority to enter into this Amended and Restated Research Agreement; (b) it is in good standing with all relevant governmental authorities; (c) it has taken *all* corporate actions necessary to authorize the execution and delivery of this Amended and Restated Research Agreement and the performance of its obligations under this Amended and Restated Research Agreement; (d) the performance of its obligations under this Amended and Restated Research Agreement does not constitute either a default under its charter documents or a violation of any court order; and (e) it or one of its Affiliates Controls the Shell Technology and it has the right to make the grants set forth in this Amended and Restated Research Agreement.

9.3 Covenants of Codexis. Codexis covenants that, during the Term, without the prior written consent of Shell, it (a) will act exclusively with Shell regarding the rights and research described herein; (b) will not (i) conduct research, discover or develop biocatalysts, and associated processes for the use of such biocatalysts, in the Field of Use for any other party or (ii) enter into any other agreements to conduct research., discover or develop biocatalysts, and associated processes for the use of such biocatalysts, in the Field of Use (including without limitation any agreement to convert Biomass to fermentable sugars unless such other party has provided express assurance in a written agreement that such fermentable sugars shall be used only outside the Field of Use); (c) will maintain technical personnel with sufficient skill,

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experience and expertise to perform its obligations under the Program; and (d) will not (i) provide any Third Party, including the United States government or agency thereof, any claim to rights relating to the Codexis Technology or the Program Technology, or (ii) enter into any agreements, commitments or other arrangement with any Third Party, including the United States government or agency thereof, in each case that would (1) prohibit Codexis from fulfilling its obligations hereunder or (2) be inconsistent or *in* conflict with the rights granted to Shell hereunder. Codexis further covenants that, during the Term, (A) Codexis will provide written notice to Shell in the event that Codexis has a bona fide business opportunity with a Third Party available to Codexis that would involve the conversion of Biomass into fermentable sugars, such sugars to be used to generate product(s) outside the Field of Use and, to the extent that Codexis is not precluded, whether by confidentiality obligations or other similar restrictions, Codexis shall inform Shell of the name of such Third Party and such product(s) outside the Field of Use; and (B) in the event that Codexis reasonably believes that any Third Party with which Codexis entered into an agreement in accordance with Section 9.3(b)(ii) above is practicing intellectual property owned or otherwise controlled by Codexis to convert Biomass to fermentable sugars, where such sugars are being used in the Field of Use for the benefit of such Third Party or any party other than Shell or a Shell Affiliate, Codexis shall take reasonable steps, including appropriate legal action, to enforce its rights to stop such use.

9.4 Covenants of Shell. Shell covenants that it will not, without the prior written consent of Codexis, (a) reverse engineer, deconstruct or in any way determine, or attempt to reverse engineer, deconstruct or in any way determine, the structure or composition of any Biocatalyst developed by Codexis hereunder, except *as* expressly provided under 7.3(a) of the Amended and Restated License Agreement for any particular identified Biocatalyst; or (b) modify or otherwise create any derivative of any such Biocatalyst; or (c) do indirectly, either through a Third Party or a Shell Affiliate, any of the activities contained in (a) or (b) above that Shell itself agrees not to do. Notwithstanding the foregoing, in the event that Shell desires to modify or otherwise create any derivative of any Biocatalyst developed by Codexis hereunder and Codexis notifies Shell in writing within one hundred twenty (120) days after receipt by Codexis of a written request by Shell to modify or otherwise create any derivative of any such Biocatalyst that it is unwilling or unable to perform such modification or otherwise create such derivative under commercially reasonable terms, then Shell shall be relieved of its obligations under this Section 9.4 with respect to such Biocatalyst.

9.5 Disclaimer of Warranties. EXCEPT AS SPECIFICALLY SET FORTH IN THIS ARTICLE 9, NEITHER PARTY MAKES ANY REPRESENTATION OR WARRANTY, EXPRESS OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR USE, NON-INFRINGEMENT, AND ANY OTHER STATUTORY WARRANTY.

ARTICLE 10

INDEMNIFICATION

10.1 Employees and Property. Each of Codexis and Shell (each, the "Indemnitor") shall indemnify, defend and hold the other Party and its Affiliates and their respective agents,

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employees, consultants, officers and directors (the "**Indemnitees**") harmless from and against any and all liability, damage, loss, cost or expense (including reasonable attorneys' fees) (collectively **„Losses**"), arising from any claims or suits arising from (a) bodily injuries, including fatal injury or disease, to the Indemnitor's employees, and (b) damage to tangible, real or personal property of Indemnitor and/or Indemnitor's employees arising from or in connection with the performance of this Amended and Restated Research Agreement. **THrs INDEMNITY SHALL APPLY IN FULL EVEN THIOUGH TIE CAUSE OF IBE INJURIES, LOSS OR DAMAGE WAS TIE NEGLIGENCE OFTHE INDEMNITEE OR THE INDEMNITEE'S REP RESENTATIVES.**

10.2 Third Parties.

(a) **Indemnification by Codexi.s:** Code.xis shall indemnify, defend and hold the Shell Indemnitees harmless from and against any and all Losses arising out of any Third Party claims or suits arising from: (i) breach by Codexis of any of its representations, warranties or covenants under this Amended and Restated Research Agreement; or (ii) Codexis' faHure to perform its obligations under this Amended and Restated Research Agreement; or (iii) during the Term, infringement of patent rights owned or otherwise controUed by such Third Party as a result of Codexis' research activities under this Amended and Reseated Research Agreement; provided that Codexis' indemnification obligations pursuant to this Section 10.2(a)(iii) shall not extend to any such Loss that arises from Codexis' activities with respect to intellectual property provided to Codexis or any Affiliate of Code.xis by or on behalf of Shell or any Affiliate of Shell, or to such activities with respect to improvements made by Codexis or any Affiliate of Codexis to such intellectual property under the Program; or (iv) the negligence, willful misconduct or strict liability of Codexis or its Affiliates, and its or their directors, officers. agents. employees, sublicensees or consultants; except in any such case for Losses to the extent, and only to the extent, reasonably attributable to a breach by ShelJ of its representations and warranties set forth in this Amended and Restated Research Agreement or the Shell Indemn. itees having committed an act or acts of gross negligence, recklessness or willful misconduct. For purposes of clarification, the Parties acknowledge and agree that Codexis' indemnification obligations pursuant to Section 10.2(a)(iii) shall not apply to any liability. damage, loss, cost or expense (including attorneys' fees) as a result of any activities conducted under the Amended and Restated License Agreement.

(b) **Indemnification by Shell:** Shell shall fully indemnify, defend and hold the Codexis Indemnitees harmless from and against any and all Losses arising out of any Third Party claims or suits arising from: (i) breach by Shell of its representations, warranties or covenants under this Amended and Restated Research Agreement; or (ii) Shell's failure to perform its obligations under this Amended and Restated Research Agreement; or (iii) the use under this Amended and Restated Research Agreement by Shell of any Biocatalyst except to the extent such Losses relate to the infringement of any intellectual property right of a Third Party; or (iv) infringement of patent rights owned or otherwise controlled by such Third Party as a result of intellectual property provided to Codex.is or any Affiliate of Codexis by or on behaJf of Shell or any Affiliate of Shell, or to such activities with respect to improvements made by Codexis or any Affiliate of Codexis to such intellectuJ property under the Program or (v) the negligence, willful misconduct or strict liability of Shell or its Affiliates, and its or their directors, officers, agents, employees, sublicensees or consultants; or (v) the activities of SheJJ employees carrying out Research Plans in Codexis' facilities pursuant to Section 2.5(b); except in any such case for

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Losses to the extent, and only to the extent, reasonably attributable to a breach by Codexis of its representations and warranties set forth in this Amended and Restated Research Agreement or the Codexis Indemnities having committed an act or acts of gross negligence, recklessness or willful misconduct.

10.3 Environmetnal. Notwithstanding any other indemnification obligation in this Amended and Restated Research Agreement, and in addition to any rights the Parties may have under relevant federal, state, or local statutory and common laws, each Party shall fully indemnify, defend and hold the other Party and its Affiliates harmless from and against any and all Losses incurred as a result of Environmental Matters; provided, however, that this indemnification shall not apply to the extent any such Losses result from the acts or omissions of personnel of the indemnified Party or its Affiliates which occur at any site of the indemnified Party or the site of any supplier of the indemnified Party. For purposes of this Section 10.3, **"Environment Matters"** shall mean:

(a) the operation by the indemnifying Party, its Affiliates, sublicensees or subcontractors of any site or facility in a manner that *is* not in compliance with and in violation of any Environmental Law;

(b) any release of Hazardous Materials into the environment by the indemnifying Party, its Affiliates, sublicensees or subcontractors; or any Hazardous Materials that have been Disposed of at a site of the indemnifying Party or any site of any supplier (other than Codexis as supplier) of the indemnifying Party or other site or facility operated by the indemnifying Party, its Affiliates or its subcontractors, as the term Disposed is defined in applicable Environmental Laws;

(c) any failure to obtain or maintain all permits and provide all notices required by Environmental Laws for the lawful operation of any site of the indemnifying Party or any site of any supplier of the indemnifying Party or other facilities or sites operated by the indemnifying Party, its Affiliates, sublicensees or subcontractors; and

(d) any other actual or alleged act or omission relating to the handling or disposal of Hazardous Materials at any site of the indemnifying Party or any site of any supplier of the indemnifying Party or the handling or disposal of Hazardous Materials by the indemnifying Party, its Affiliates, sublicensees or subcontractors at any other facility or site.

For purposes of this Section 10.3, **"Environmental Law"** shall mean any treaty, law, ordinance, regulation or order of any jurisdiction, relating to environmental matters, including, but not limited to, matters governing air pollution; water pollution; the use, handling, reporting, release, storage, transport, or disposal of Hazardous Materials as defined herein above; exposure to or discharge of Hazardous Materials; occupational safety and health; and public health.

For purposes of this Section 10.3, **"Hazardous Material"** includes, but is not limited to, air contaminant, water pollutant, hazardous material, hazardous waste, hazardous substance, toxic and hazardous substance, medical waste, infectious waste, "chemicals known to the State of California to cause cancer or reproductive toxicity", asbestos and PCB's, as such substances are defined under any applicable federal, state or local statute, regulation, rule or ordinance.

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10.4 Notification of Claim; Conditions to Indemnification Obligations. As a condition to a Party's right to receive indemnification under this Article 10, it shall: (a) promptly notify ("**Claim Notice**") the other Party as soon as it becomes aware of a claim or suit for which indemnification may be sought pursuant hereto (provided that the failure to give a Claim Notice promptly shall not prejudice the rights of an indemnified Party except to the extent that the failure to give such prompt notice materially adversely affects the ability of the indemnifying Party to defend the claim or suit); (b) cooperate with the indemnifying Party in the defense of such claim or suit, at the expense of the indemnifying Party; and (c) if the indemnifying Party confirms in writing to the indemnified Party its intention to defend such claim or suit within fifteen (15) business days of receipt of the Claim Notice, permit the indemnifying Party to control the defense of such claim or suit, including without limitation the right to select defense counsel: provided that if the indemnifying Party fails to (i) provide such confirmation in writing within the fifteen (15) business day period; or (ii) diligently and reasonably defend such suit or claim at any time, its right to defend the claim or suit shall terminate immediately in the case of (i) and otherwise upon twenty (20) days' written notice to the indemnifying Party and the indemnified Party may assume the defense of such claim or suit at the sole expense of the indemnifying Party and may settle or compromise such claim or suit without the consent of the indemnifying Party. In no event, however, may the indemnifying Party compromise or settle any claim or suit in a manner which admits fault or negligence on the part of any indemnified Party or that otherwise materially affects such indemnified Party's rights under this Amended and Restated Research Agreement or requires any payment by an indemnified Party without the prior written consent of such indemnified Party. Except as expressly provided above, the indemnifying Party will have no liability under this Article 10 with respect to claims or suits settled or compromised without its prior written consent. The indemnified Party shall have the right, but not the duty, at its sole cost and expense, to participate in the defense of any claim or suit hereunder with attorneys of its own selection without relieving the indemnifying Party of any of its obligations hereunder.

ARTICLE II

TERM AND TERMINATION

11.1 Term. The initial term of this Amended and Restated Research Agreement will commence on the Effective Date and, unless earlier terminated in accordance with Section 11.2, 11.3, 12.2 or 12.4 below, shall continue in effect until six (6) years after the Effective Date ("**Initial Term**"); provided, however, that on or before the fourth (4th) anniversary of the Effective Date, the Parties will engage in discussions concerning the progress of the research under the Program, applicable future Milestones and Program needs, including the projected number of FfEs to complete the work under the Program, and the Parties shall determine whether the Initial Term will be extended under the same terms and conditions of this Restated and Amended Research Agreement. The term of this Amended and Restated Research Agreement may be extended after the Initial Term by consecutive, successive two (2) year periods (each, a "**Renewal Term**") upon the mutual written agreement of the Parties at least six (6) months prior to the end of the Initial Term or the current Renewal Term, as applicable (the Initial Term, together with any and all Renewal Terms, the "**Term**").

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J1.2 Termination for Convenience.

(a) At any time after the third (3rd) anniversary of the Effective Date, Shell may, in its sole discretion, terminate this Amended and Restated Research Agreement upon six (6) months written notice to Codexis.

(b) If at any time after the third (3rd) anniversary of the Effective Date, Shell determines, in accordance with Section 2.6(c), to decrease the number of FTEs assigned by Codexis to perform Codexis' obligations under the Program to less than **[twenty-four (24)]**, Codexis shall have the right, but not the obligation, to terminate this Amended and Restated Research Agreement upon ninety (90) days written notice to Shell; provided, however that in the event that (i) each such FTE reduction by Shell occurs after successful achievement of the applicable Milestone for each Research Plan and (ii) Shell (or a Shell Affiliate or sublicensee) is actively developing the Program Technology for commercial application, then Codexis shall have no right to terminate this Amended and Restated Research Agreement pursuant to this Section J1.2(b).

II.3 Termination Upon Material Breach. Material failure by a Party to comply with any of its obligations contained herein shall entitle the Party not in default to give to the Party in default written notice (a "**Default Notice**") specifying the nature of the default in reasonable detail, requiring such defaulting Party to make good or otherwise cure such default, and stating the non-defaulting Party's intention to terminate this Amended and Restated Research Agreement if such default is not cured. If such default is not cured within sixty (60) days after the date the Default Notice was sent, then the Party not in default shall be entitled, without prejudice to any other rights conferred on it by this Amended and Restated Research Agreement, and in addition to any other remedies available to it by law or in equity, to terminate this Amended and Restated Research Agreement by written notice of termination to the defaulting Party; provided, however, that if the Party receiving such Default Notice (the "**Disputing Party**") has a reasonable basis for disputing that it is in default and such Party provides written notice thereof to the other Party before the expiration of such sixty (60) day cure period, then the Disputing Party shall have the right, prior to the expiration of such sixty (60) day period, to submit such dispute for resolution in accordance with the provisions of Section 12.7; provided further that in the event that as a result of such resolution, the Disputing Party is found to be in default and such default is not cured within forty-five (45) days after the date of such resolution, then the Party not in default shall be entitled, without prejudice to any other rights conferred on it by this Amended and Restated Research Agreement, and in addition to any other remedies available to it by law or in equity, to terminate this Amended and Restated Research Agreement by written notice of termination to the Disputing Party.

11.4 Consequences of Expiration or Termination.

(a) If Shell terminates this Amended and Restated Research Agreement pursuant to Section I 1.3 (Material Breach), 12.2 (Assignment) or 12.4 (Force Majeure), or if Codexis terminates this Amended and Restated Research Agreement pursuant to Section [1.2(b) (Termination for Convenience), then (i) the Amended and Restated License Agreement shall continue according to its terms; and (ii) Codexis shall pay to Shell any amount previously paid to

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Codexis pursuant to Section 3.3 that, as of the effective date of such termination, has not been spent on performing Codexis' obligations under the Program and does not correspond to a non-cancellable commitment with respect to such performance; provided, however, that in the event that Shell terminates this Amended and Restated Research Agreement prior to the sixth (6th) anniversary of the Effective Date pursuant to Section 11.3 (Material Breach), 12.2 (Assignment) or 12.4 (Force Majeure) (provided such termination pursuant to Section 12.4 occurs no sooner than nine (9) months after the applicable force majeure event and provided further that Codexis is the Party affected by such force majeure event and provides Shell with the full particulars thereof as soon as it becomes aware of the same (including its best estimate of the likely extent and duration of the interference with its activities), and Codexis can represent in good faith that it can resume its performance under this Amended and Restated Research Agreement, no later than nine (9) months after such force majeure event), Codexis shall refund the exclusivity fee paid by Shell to Codexis in accordance with Section 3.2 on a *pro rata* basis based on the quotient obtained by dividing (A) the duration of time remaining between the effective date of such termination and the sixth (6th) year anniversary of the Effective Date by (B) five (5) years. By way of example, if Shell terminates this Amended and Restated Research Agreement pursuant to Section 11.3 on the fourth (4th) anniversary of the Effective Date, then Codexis shall refund Eight Million UnHed States Dollars (\$8,000,000) to Shell.

(b) The following Articles and Sections of this Amended and Restated Research Agreement shall survive its termination or expiration : Articles 4, 5, JO and 12, and Sections 2.4(a)(iii), 6.1, 8.3, 9.4, 9.5 and 11.4.

(c) Termination of this Amended and Restated Research Agreement for any reason shall be without prejudice to (i) the rights and obligations of the Parties set forth in any Articles or Sections which provide by their terms performance by either Party subsequent to termination; (ii) Codexis' rights to receive all payments accrued under Article 3 (subject to Section 11.4(a) above, if applicable), or (iii) any other remedies which either Party may otherwise have.

ARTICLE 12

GENERAL PROVISIONS

12.1 Relationship of the Parties. The Parties shall perform their obligations under this Amended and Restated Research Agreement as independent contractors and nothing contained in this Amended and Restated Research Agreement shall be construed to make either Codexis or Shell partners, joint venturers, principals, representatives or employees of the other. In particular, without limiting the generality of the foregoing, (a) none of the FfEs assigned by Codexis to perform its obligations under the Program shall be construed, or deemed to be, employees of Shell, and (b) none of the personnel assigned by Shell to perform its obligations under the Program shall be construed, or deemed to be, employees of Codexis. Neither Party shall have any right, power or authority, express or implied to bind the other. Shell and Codexis agree that this Amended and Restated Research Agreement shall not constitute a partnership for tax purposes. In the event, however, that this Amended and Restated Research Agreement were

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so construed, then Shell and Codexis agree to be excluded from the provisions of Subchapter K of the United States Internal Revenue Code of 1986, as amended.

12.2 Assignments. Except as expressly provided herein, neither this Amended and Restated Research Agreement nor any interest hereunder may be assigned, nor any other obligation delegated, by a Party without the prior written consent of the other Party; provided, however, that each Party shall have the right to assign this Amended and Restated Research Agreement without consent to an Affiliate of such Party or to any successor *in* interest to such Party by way of merger, consolidation or other business reorganization or the sale of aJI or substantially all of its assets and further provided that in the event the non-assigning Party believes, in its sole discretion, that the assignment is to a direct competitor of such non-assigning Party in the Field of Use, such non-assigning Party may immediately terminate this Amended and Restated Research Agreement. This Amended and Restated Research Agreement shall be binding upon successors and permitted assigns of the Parties. Any assignment not in accordance with this Section 12.2 will be null and void.

12.3 Further Actions. Each Party agrees to execute, acknowledge and deliver such further instruments and to do all such other acts as may be necessary or appropriate in order to carry out (he express provisions of this Amended and Restated Research Agreement.

12.4 Force Majeure. Neither Party shall be liable to the other for failure or delay in the performance of any of its obligations under this Amended and Restated Research Agreement for the time and to the extent such failure or delay is caused by earthquake, riot, civil commotion, war, terrorist acts, strike, flood, or governmental acts or restriction that is beyond the control of the respective Party. The Party affected by such force majeure will provide the other Party with full particulars thereof as soon as it becomes aware of the same (including its best estimate of the likely extent and duration of the interference with its activities), and will use commercially reasonable efforts to overcome the difficulties created thereby and to resume performance of its obligations as soon as practicable. If the performance of any obligation under this Amended and Restated Research Agreement is delayed owing to a force majeure for any continuous period of more than ninety (90) days, either Party may terminate this Amended and Restated Research Agreement by giving to the other Party not less than ten (10) business days notice in writing. In the event of any force majeure event that delays the performance of either Party under this Amended and Restated Research Agreement, the Term shall automatically be extended for the period of time that such performance is delayed. In the event of any force majeure event that delays Codexis' performance under this Amended and Restated Research Agreement, Shell's payment obligations pursuant to Section 3.3 shall be suspended for the duration of such delay. Notwithstanding anything to the contrary, the payment of money shall not be subject to this Section 12.4.

12.5 Captions. The captions to this Amended and Restated Research Agreement are for convenience only, and are to be of no force or effect in construing or interpreting any of the provisions of this Amended and Restated Research Agreement.

12.6 Governing Law. This Amended and Restated Research Agreement will be governed by and interpreted in accordance with the laws of the State of New York, applicable to

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contracts entered into and to be performed wholly within the State of New York, excluding conflict of laws principles.

12.7 Dispute Resolution; Jurisdiction and Venue. Any controversy or claim (**..Dispute**"), whether based on contract, tort, statute or other legal or equitable theory (including but not limited to any claim of fraud, misrepresentation or fraudulent inducement or any question of validity or effect of this Amended and Restated Research Agreement including this clause) arising out of or related to this Amended and Restated Research Agreement (including but not limited to any amendments, annexations, and extensions) or the breach thereof shall be settled by consultation between the Parties initiated by written notice of the Dispute to the other Party. In the event such consultation does not settle the Dispute within thirty (30) days after written notice of such Dispute, then the Dispute shall be settled by binding arbitration in accordance with the then current commercial arbitration rules of the American Arbitration Association and this provision. The arbitration shall be governed by the United States Arbitration Act, 9 U.S.C. §§ 1-16 (the "**Act**") to the exclusion of any provision of state law inconsistent therewith or which would produce a different result. Judgment upon the award rendered by the arbitrator may be entered by any court having jurisdiction. The arbitration shall be held in Chicago, Illinois. The Parties shall attempt in good faith to agree on a single neutral arbitrator with relevant industry experience to conduct the arbitration. If the Parties do not agree on a single neutral arbitrator within ten (10) days after receipt of an arbitration notice, each Party shall select one (1) arbitrator and the two (2) Party-selected arbitrators shall select a third arbitrator with relevant industry experience to constitute a panel of three (3) arbitrators to conduct the arbitration in accordance with the Act. In the event that only one of the Parties selects an arbitrator, then such arbitrator shall be entitled to act as the sole arbitrator to resolve the Dispute or any and all unresolved issues subject to the arbitration. Each and all arbitrator(s) of the arbitration panel conducting the arbitration must and shall agree to render an opinion within twenty (20) days after the final hearing before the panel. The arbitrator(s) shall determine the claim of the Parties and render a final award in accordance with the substantive law of the State of New York, excluding the conflicts provisions of such law. The arbitrator shall set forth the reasons for the award in writing. The terms hereof shall not limit any obligations of a Party to defend, indemnify or hold harmless another Party against court proceedings or other claims, losses damages or expenses. All proceedings and decisions of the arbitrator(s) shall be deemed Confidential Information of each of the Parties, and shall be subject to Article 6 hereof. Notwithstanding anything herein to the contrary, a Party may seek a temporary restraining order or a preliminary injunction from any court of competent jurisdiction in order to prevent immediate and irreparable injury, loss, or damage on a provisional basis, pending the decision of the arbitrator(s) on the ultimate merits of any Dispute. Each Party agrees that all Disputes arising under this Amended and Restated Research Agreement shall be brought only against the Parties of this Agreement, as applicable and neither Party shall name an Affiliate company, except as may be required by Article 12.2.

12.8 Notices and Deliveries. Any notice, request, delivery, approval or consent required or permitted to be given under this Amended and Restated Research Agreement will be in writing and will be deemed to have been sufficiently given on the date of receipt if delivered in person, transmitted by telecopier (receipt verified) or by express courier service (signature required) or five (5) days after it was sent by registered letter, return receipt requested (or its equivalent), provided that no postal strike or other disruption is then in effect or comes into

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effect within two (2) days after such mailing, to the Party to which it is directed at its address or facsimile number shown below or such other address or facsimile number as such Party will have just given by notice to the other Party.

If to Codexis, addressed to:

Codexis, Inc.
200 Penobscot Drive
Redwood City, CA 94063
Attention: Chief Executive Officer
Telephone: 650-980-5600
Fax: 650-298-5449

with a copy to:

Codexis, Inc.
200 Penobscot Drive
Redwood City, CA 94063
Attention: General Counsel
Telephone: 650-421-8160
Fax: 650-421-8108

If to Shell, addressed to:

Shell Oil Products (US)
910 Louisiana Street
Houston, TX 77002
Attention: Fuel Development Program Manager-Americas
Telephone: 713-241-1461
Fax: 713-241-9800

with a copy to:

Shell Oil Company
Associate General Counsel, Intellectual Property Services
910 Louisiana
Houston, TX 77002
Fax: 713-241-6617

12.9 No Consequential Damages. EXCEPT PURSUANT TO ARTICLE 10 OR AS A RESULT OF ANY CONFIDENTIALITY AGREEMENT ENTERED INTO BETWEEN CODEXIS AND A SHELL EMPLOYEE IN ACCORDANCE WITH SECTION 2.5(b), IN NO EVENT WILL A PARTY OR ANY OF ITS RESPECTIVE AFFILIATES BE LIABLE TO THE OTHER PARTY OR ANY OF ITS AFFILIATES FOR SPECIAL, INDIRECT, CONSEQUENTIAL OR PUNITIVE DAMAGES, WHETHER IN CONTRACT, WARRANTY, TORT, NEGLIGENCE, STRICT LIABILITY OR OTHERWISE, INCLUDING BUT NOT

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LIMITED TO, LOSS OF PROFITS OR REVENUE, OR CLAIMS OF CUSTOMERS OF ANY OF THEM OR OTHER THIRD PARTIES FOR SUCH DAMAGES.

12.10 Waiver. A waiver by a Party of any of the terms and conditions of this Amended and Restated Research Agreement in any instance will not be deemed or construed to be a waiver of such term or condition for the future, or of any subsequent breach hereof. All rights, remedies, undertakings, obligations and agreements contained in this Amended and Restated Research Agreement will be cumulative and none of them will be in limitation of any other remedy, right, undertaking, obligation or agreement of either Party.

12.11 Severability. When possible, each provision of this Amended and Restated Research Agreement will be interpreted in such manner as to be effective and valid under applicable law, but if any provision of this Amended and Restated Research Agreement is held to be prohibited by or invalid under applicable law, such provision will be ineffective but only to the extent of such prohibition or invalidity, without invalidating the remainder of such provision or of this Amended and Restated Research Agreement. The Parties will make a good faith effort to replace the invalid or unenforceable provision with a valid one which in its economic effect is most consistent with the invalid or unenforceable provision.

12.12 Counterparts. This Amended and Restated Research Agreement may be executed simultaneously in counterparts, any one of which need not contain the signature of more than one Party but both such counterparts taken together will constitute one and the same agreement.

12.13 Compliance with Laws. Each Party shall comply with all applicable statutes, laws, regulations, enactments, directives and ordinances and all injunctions, decisions, directives, judgments and orders of any governmental authority in effect at any time in connection with the performance of its obligations under this Amended and Restated Research Agreement.

12.14 Amendment. No amendment of any provision of this Amended and Restated Research Agreement shall be binding on a Party to this Amended and Restated Research Agreement unless consented to in writing and signed by such Party. Signatures and writings in an electronic form do not constitute or create a writing signed by a Party.

[Signature page follows]

(•) Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

IN WITNESS WHEREOF, the Parties have caused this Amended and Restated Research Agreement to be executed by their respective duly authorized officers as of the Execution Date, each copy of which will for all purposes be deemed to be an original.

CODEXIS, INC.

By: /s/ Alan Shaw

Name: Alan Shaw

Title: President

EQUILON ENTERPRISES LLC

DBA SHELL OIL PRODUCTS US

By: /s/ David A. Sexton

Name: David A. Sexton

Title: President

[Signature Page to Amended and Restated Collaborative Research Agreement]

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EXHIBIT 1.21

Research Plans

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Schedule 1

Research Plan for First Contract Year

Summary

Key economic parameters for the [saccharification of biomass] include:

- (i) yield of [fermentable sugars],
- (ii) enzyme load,
- (iii) cost of enzyme manufacture ,
- (iv) equipment costs,
- (v) residence time of reaction, and
- (vi) energy usage .

Enzyme systems improved for activity in [saccharification] process conditions can reduce enzyme load requirements , reduce residence time, and improve volumetric productivity of [fermentable sugars]. Therefore, the goal of the research program is to **[lay the groundwork for development of an improved enzymatic cellulase system for the saccharification of biomass hydrolyzate, producing fermentable sugars for use in fuel production]**.

For this 12 month research plan, efforts will be focused on:

- (i) identifying and obtaining [cellulose] genes and enzymes to assemble a baseline [cellulose] system,
- (ii) identifying and obtaining suitable [cellulosic substrates {including soluble and crystalline purified cellulose, as well as biomass hydrolyzates}], and
- (iii) enabling and executing an evolution campaign directed at **[one cellulase enzyme of the cellulase system]**.

Development of an evolution-suitable system will include:

- (i) establishment of a genetic expression system, and
- (ii) development of screening and assay formats, in each case suitable for high-throughput catalyst production and analysis.

Implementation of the evolution campaign will consist of

- (i) generation of initial genetic diversity.
- (ii) library design.
- (iii) DNA shuffling and library construction, and
- (iv) implementation of the screening program to identify enzyme variants possessing improved properties.

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The screening process may consist of a series of tiered assays, starting with high-throughput [simple] screens, and gradually shifting to lower throughput, **[but more informationally oriented]** assays. Assay data and mutational analysis will be assessed, and desirable variants and/or mutations will be re-introduced into subsequent "rounds" of evolution and screening, until enzyme variants are identified that meet or exceed the desired performance criteria. Ultimately improved enzyme variants will be assessed under **[process-relevant]** conditions, which may include a determination of their activity in the presence of **[other enzymes in the cellulase system, and activity on (or in the presence of) biomass hydrolyzates]**. It is anticipated that **the evolution campaign may begin with simplified substrates; as more complex substrates and assays are developed in the program, these may be implemented in the screening process]**. This approach would allow for the simultaneous execution of the evolution campaign with assay development.

Introduction

[Enzymatic saccharification of cellulose involves a mixture of enzymes that work together synergistically. Cellulases such as endo-P-1,4-glucanase (EC 3.2.1.4), exo-cellobiohydrolase (EC 3.2.1.91), and P-glucosidase (P-D-glucosidic glucosylhydrolase; EC 3.2.1.21) are required. In this type of system, endoglucanase and cellobiohydrolase enzymes degrade cellulose to cellobiose, which is then cleared to glucose by p-glucosidase. For hemicellulosic biomass, additional enzymes are required to degrade carbohydrate polymers such as xylose, arabinose, and others; such enzymes include various xylanase, debranching enzymes, and others.]

[The available literature suggests that improvements in the cellulase system may be achieved by improving the activity of the P-glucosidase (cellobiase) component. Endoglucanases and cellobiohydrolases are inhibited by cellobiose (Kadam and Demain (1989) Biochem. Biophys. Res. Commun. 161:706); for example, commonly used cellulases are inhibited by 50% at a low concentration (3.3 g/l) of cellobiose (US Patent No. 6,939,704). One reported solution to this has been to add p-glucosidase exogenously, however this has not been viewed as cost-effective. A preferred solution would be to create highly active and/or over-expressed p-glucosidase enzymes. Therefore, this class of enzymes is suggested as a first evolution target for this program.] Several improvements in the [p]-glucosidase enzymes may be desired, such as:

- (i) Decreased product inhibition. Although [p]-glucosidase enzymes from nature vary in their sensitivity to [glucose] inhibition, most [microbial p-glucosidases that catalyze the hydrolysis of cellobiose] are highly sensitive to [glucose] inhibition, thereby limiting enzyme activity and overall [saccharification] rate [(Gueguen et al. 1995. Enzyme Microb. Technol. 78:900)].
- (ii) Increased substrate tolerance. While some [cellobiose-tolerant (15%) p- glucosidases] from nature have been described [(e.g. Saha and Bothast 1996. Appl. Environ. Microbiol. 62:3165)], most [p-glucosidases] are inhibited by [cellobiose]

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(Schmid and Wandrey. 1987. Biotechnol. Bioeng. 30:571)), limiting the potential for the final [saccharification] rates.

- (iii) Increased specific activity. Activity improvements with these enzymes have been demonstrated to result in increases in [saccharification] rates (McCarthy et al. 2004. J. Biol. Chem. 279:11495)).
- (iv) Increased activity in process environment [(thermoactivity, thermotolerance, pH
 Ideally, all enzymes required for use in a given reaction will possess matching preferences for the environmental aspects of the reaction, such as pH and temperature activity optima. [For example, most exoglucanase and cellobiohydrolase enzymes possess an optimal temperature of -55°C, so possessing a p-glucosidase with optimal activity at this temperature is desirable. The saccharification reaction may benefit from the Arrhenius equation (i.e. higher temperature giving a faster reaction), so increased activity at still higher temperatures may also be desired. Since saccharification reactions typically run for considerable periods of time (US 69397(4), thermotolerance is likely important. Thermotolerant P-glucosidases have been reported (e.g. Saha and Bothast. Biotechnol. 1996. Lett. 18:15.5, Yernool et al. 2000. J. Bact. 182:5172) and will be considered for use as starting diversity. Other process-relevant traits of interest may include alteration of pH optima, and alleviation of inhibition from process contaminants].
- (v) Altered substrate specificities. Although [P-glucosidases] are known to be most active on [cellobiose], some possess activity on [soluble cellodextrins (Goode et al. 1984. Appl. Environ. Microbiol. 48:265)] with varying efficiencies on [various lengths of] substrates. [For example, the *Candida peltata* enzyme can hydrolyze cellobiose, cellotriose, cellobiotetraose, cellopentaose, and cellohexaose, with *K_m* values of 66, 39; 35, 21, and 18 mM, respectively (Saha and Bothast. 1996. Appl. Environ. Microbiol. 62:3165)]. Changing the substrate orientation towards [longer cellodextrins] might be advantageous [either to the synergy of the saccharification enzymes, or for the substrate preference for the ensuing fermentation organism, which have different preferences for the uptake and fermentation of cellodextrins].
- (vi) Increased expression, secretion. [*Trichoderma reesei*], a commonly used organism for [cellulose] production, does not produce and secrete sufficient [p-glucosidase (-1 % of total secreted proteins)] to drive commercial [saccharification] demands [(Lynd et al. 2002, Microbiol. Mol. Biol. Rev. 66:506). *T. reesei* cellulase preparations, supplemented with *Aspergillus* p-glucosidase, are considered most often for commercial saccharification (Reczey et al. 1998. Appl. Biochem. Biotechnol. 70-72:225), and over-expression of this enzyme has been shown to result in increased saccharification (US 6939704)]. These enzymes could be engineered for improved expression [for a particular expression host. Most P-glucosidases remain trapped in the cell wall of the producing fungus (Messner et al. 1990. Arch. Microbiol. 154:150), which impedes their utility in saccharification. This feature is common in fungi, likely due to an evolutionary

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advantage of sequestering the enzyme near the cell walls to facilitate the rapid uptake of glucose produced. This evolutionary constraint can be removed, improving the secretion capability and leading to a better process].

While particular enzymes in nature may possess certain characteristics for industrial use, it is rare that a native enzyme would possess all the preferred traits. The range of activities and properties known for related (homologous) enzymes may give an indication of the "evolvability" for a particular trait, that is, they are permitted by the enzyme **{(reviewed in O'Loughlin et al. 2006.**

Protein Eng. Design Selection. 19:439].

Codexis technology allows for desirable properties from different enzymes to be combined, and improved further. Importantly, multiple properties may be evolved at the same time; such multi-trait evolution has been demonstrated using Codexis technology in other programs.

[In addition to technical considerations, selection of α -glucosidase as the first evolution target provides practical advantages to the program, such as allowing for rapid program implementation due to the soluble nature of the substrate(s), and a good potential for rapid implementation of existing Codexis strengths such as high throughput expression and assay systems. Starting materials for this target are likely to be available, including starting genes and substrates. Enzyme variants should be of use *in* the development of the cellulase system].

Other enzyme targets for improvement will be considered during the course of the program. Possible candidates might include **[celJobiohydri:alphaJases (e.g. improved c-elibiose inhibition profile, thermostability), xylanases, and/or endoglucosidases. In each case, it is suggested that initial screening utilize soluble substrates, or at a minimum simplified/purified cellulosic substrates. This would allow for progress in the evolution campaign whilst the more complex assay formats are developed].**

Process Definition

At the initiation of the program, an extensive review of the scientific, commercial, and patent literature will be conducted. Due to the large amount of prior work in this area, this is anticipated to be a significant task. This review is required to establish a reasonable understanding of relevant technical issues and, importantly, the intellectual property landscape, and the validation of appropriate research targets and materials. Suitable starting enzymes and the genes that encode them will be identified for use in the program. Possible licensing opportunities with third parties may also be identified. This activity will continue throughout the life of the research program in order to stay abreast of new information released during the program term.

Establishing a System for the [Cellulase] Evolution Campaign

Genetic System Development for **alpha-glucosidase**

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Several **[natural]** sources of **[p-glucosidase]** have been identified and functionally expressed/secreted in prokaryotic and eukaryotic hosts. The starting gene(s) that will be used in this program will be **[determined by the initial patent and scientific literature review. One particular benefit to Codexis' technology is that if the program is blocked from using a performance-preferred natural variant, the program may be executed instead using another (non-blocked) homolog, even one with suboptimal characteristics. Codexis has successfully employed this approach in many other programs. Other relevant information, such as protein structures, will be analyzed].**

Genes will be obtained **[either by synthesis or cloning]**, and their expression in appropriate **[evolution-amenable]** hosts will be assessed. High-throughput growth and expression formats will be developed to enable the handling of, for example, **[several thousand]** isolates **[(such as that anticipated from DNA shuffled libraries)]**. Suitable screening formats will result in the detection of the appropriate enzymatic activity in high-throughput utilizing assay methods also developed under the program.

Assay Development **[for 6-glucosidase]**

[The substrate for 6-glucosidase is cellobiose, and other cellodextrins, if desired. Since these are soluble (and commercially available) substrates, assays may be readily implemented in high-throughput]. If a genetic selection or a visual +/- activity screen utilizing is possible, very large numbers of isolates **[up to 100k]** may be screened to enrich for live isolates and exclude inactive isolates. Such selections and assays are possible for this target, and these will be tested for utility in this program. For example, a shuffled library expressed in a host strain (without **[f]-glucosidase** activity) may be plated on agar containing **[cellobiose as a sole carbon source]**; only isolates possessing active enzyme would survive. Alternatively, a colorimetric substrate or assay may be available, allowing for rapid visual identification of active isolates. These techniques are particularly useful when libraries **[having high kill rates are in use, such as mutagenesis libraries (see below)]**. More analytical methods for the isolation/extraction, separation, and detection of relevant compounds (such as **[glucose]**) will be developed and implemented. At least one analytical method should be suitable for use in sufficient throughput (e.g. **[hundreds to a few thousand isolates per library]**) to enable characterization of shuffled libraries, even in the absence of a prescreen or selection. The screening process will continue through more refined and more information-rich assays in lower throughput until the desired understanding of activity is obtained.

Appropriate characteristics for the desired enzyme activity will be incorporated into the assay, **[e.g. a thermal challenge is easily incorporated in high-throughput should a thermostable enzyme be desired. Other factors to be considered include enzyme and substrate concentration, potential for product inhibition, reaction rate (optimize screening window to observe initial rates and/or prolonged reaction kinetics), etc].**

Ultimately, more complex assays will be used for screening. **[For example, assays incorporating insoluble substrates, biomass hydrolyzates], and/or [a cellulose] enzyme system,** are important to the confirmation of the desired activity. However, such complex assays and systems require development. Therefore, the initial screening will proceed **[with**

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simplified assays (e.g. soluble substrates and non-complexed enzyme)] ; the complex assays will be developed in parallel until they are sufficiently developed for use in the screening program. [The enablement of handling procedures for insoluble materials for assay is a significantly difficult task. This will include accurate dispensing of slurries, and high-throughput amenable implementation of handling procedures throughout the assay and detection process. Purified insoluble cellulosic materials (available commercially) and biomass hydrolyzates are included in this format. External sources of biomass hydrolyzate material will need to be identified and secured during the course of the program. Such sources might include academic, government and/or commercial entities. Hydrolyzates may contain significant amounts of other insoluble compounds, and will likely present additional challenges to handling and assay].

[For complex substrates and/or cellulase systems, additional measurements may require development, such as determination of reduction in substrate quantity, or changes in physical properties of substrate. Potentially useful screening and selection strategies for this and other cellulase targets were reviewed by Zhang et. al. (Biotechnol. Adv. 24, 2006, 452-481)).

The development of such [complex] assays enables the assessment of [cellulases] in systems, as well as supporting the future screening needs for the evolution of additional [cellulose] enzymes, [such as endoglucosidases and cellobiohydrolases).

Evolution Campaign (for β -glucosidase)

[While initial genetic diversity from nature will be identified as above, it is likely that additional diversity would be beneficial to the program. Codexis routinely generates such diversity via a primary library design utilizing methods for the generation of mutations from starting genes. Such methods may include error-prone PCR or error-prone shuffling). Once sufficient genetic diversity is in hand, shuffled libraries will be generated to recombine mutations. Family shuffling, a technique that can recombine related genes (e.g. from different organisms) may also be used to exchange large blocks of genetic sequences. As such libraries are created and screened, the relationships between sequences and activities are assessed using a proprietary statistical method (ProSAR). Beneficial mutations and potentially beneficial mutations are carried through into subsequent library designs and rescreened, while deleterious mutations are discarded. Subsequent libraries may also include error-prone methods should additional diversity be desired in the library. This process of analysis, design, library construction and screening may be repeated many times to achieve desired activities.

It is anticipated that at least [two] rounds of shuffling and screening may be completed for this [β -glucosidase] within the 12 month period.

Establishing a Benchmark [Cellulase] System

The [cellulose] improvement program entails [assembly of the enzyme components to form a cellulase system], which can then be used to assess shuffled [cellulases] for improved properties,

There are several different paths to enable this analysis. A preferred approach

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would entail cloning of the necessary [cellulose] genes, production of enzymes separately and formulation of the **[cellulase complex by mixing known amounts of each enzyme together (i.e., reconstitution of the cellulase cocktail)]**. This approach would require functional expression of each of the [cellobiohydrolase, endoglucanase and cellobiase] enzymes, and production of sufficient quantities of each enzyme for the activity studies. Using this approach, evolved enzyme variants may be substituted for unevolved enzymes (e.g. from the "baseline" system), and activities may be compared. Since this format allows for the independent control of each enzyme's loading, a factorial optimization of the [cellulose] mixture is possible, **[which is of significant value to assessing the synergy of these enzymes. A similar factorial optimization of a mixture of cellulases has been described in the literature (Kim et al., Biotechnol. Bioeng. 58, 1998, 494-501)]**.

There are other approaches to enable a benchmark [cellulose] system for the analysis of evolved enzyme variants. Although these are less desirable than that described above, they may be used as alternatives should difficulties arise. For example, it may be possible to obtain pure enzymes for each of the components from **[commercial entities or other external source]**, and proceed as above. A challenge to using this approach is that commercial [cellulose] preparations tend to contain mixtures of [cellulases], making deconvolution of the activities difficult.

Alternatively, a [cellulose] mixture such as that produced by a [fungal cellulose] producing organism (e.g. *[T. reesei]*) may be used as a baseline cocktail. The evolved enzyme could be spiked into the mixture, and activity compared to that obtained using the unevolved (parent) enzyme. This approach is similar to some commercial processes in which the activity of the system is "topped up" by the addition of separately made enzymes. However, while this approach may be easier and quicker to achieve, the mixture of enzymes is neither controllable nor quantifiable, so the information derived from the experiment will likely be of less value than that obtained by the preferred method above.

Another alternative would be to produce the [cellulose] enzymes from **(a single mRNA, for example on a single plasmid)**. This would provide stoichiometric control at the level, anti perhaps assumed control of enzyme concentrations, although it would not enable independent control of each enzyme's concentration. This may also enable **[a "pathway shuffling" approach, however there are other technical considerations to address, such as a possible genetic instability of the large plasmids that would result]**.

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Exmmr 1.32

Year One Final Milestone

[The Year One Final Milestone will consist of achievement of the [Cellobiase] Performance Criteria and the Model [Cellulase] System Criteria set forth below:

[Cellobiase] Performance Criteria:

A starting (cellobiase) enzyme will be evolved for improved activity using [cellobiose] subst rate. Performance of the evolved [cellobiase] must show at least a [3-fold] improvement compared to the performance of the starting [cellobiase] as measured by **fa decrease in ceJJobiose by HPLC**] tnder reaction conditions to include:

- [3.3] g/L substrate ((ccllobiosc])
- [50-100] g/L [glucose]
- [25 mM sodiumacetate] buffer, [pH 5]
- 24 h, [60]°C

Model [Cellulase] System Criteria:

Put in place a model [cellulose] system [that will convert crystalline ceJluJose to C6 sugars, and] will enable the evaluation of [individual cellulases within the system].

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EXHIBIT 2.8(E)(II)

Form Sponsored Research Agreement

SPONSORED RESEARCH AGREEMENT

THIS SPONSORED RESEARCH AGREEMENT ("Agreement"); is made as of the ____ day of _____, 200_ (the "**Effective Date**"), by and between **CODEXIS, INC.**, with principal place of business at 200 Penobscot Drive, Redwood City, California 94063 USA {"**Codexis**"}, and _____ with a principal place of business at _____ ("**Company**").

In consideration of the mutual agreement between the parties hereto, it is agreed as follows:

Section 1. PRINCIPAL INVESTIGATOR AND RESEARCH PLAN

(a) Company will undertake the research project entitled " " ("**Study**"), in accordance with the research plan attached hereto as **Exhibit A** (the "**Research Plan**"), under the direction of (the "**Principal Investigator**") Any change in the scope of work to be performed with respect to the Study requires Codexis' prior written approval. The work will be commenced on _____, 200_ and will be completed within five (5) days thereafter.

(b) Company represents and warrants that it is in possession of all necessary equipment to accomplish the Study, including the specific equipment listed in Section _ of the Research Plan (the "will be due and payable in accordance with Section 3.6 only after the achievement of") and it will utilize such Necessary Equipment in the conduct of the Study.

(c) Company and Principal Investigator agree that all work for the Study will be performed at Company's facility located at ("**Facility**"). Company and Principal Investigator agree that a single representative of Codexis (the "**Codexis Representative**") and a single representative (the "**Shell Representative**") of Equilon Enterprises LLC dba Shell Oil Products US ("**Shell**") shall be present at all times during the conduct of the Study at the Facility, which shall be scheduled at the mutual convenience of the Principal Investigator, the Codexis Representative and the Shell Representative.

Section 2. CODEXIS ENZYMES.

(a) Codexis will provide Principal Investigator with sufficient amounts of its [proprietary enzymes or microbes] identified on **Exhibit B** hereto (the "**Codexis Enzymes**") to conduct the Study as provided in the Research Plan. Company and Principal Investigator agree

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to use the Codexis Enzymes in strict accordance with the Research Plan, and not for any other purpose. Company and Principal Investigator shall not attempt to reverse engineer, deconstruct, in any way determine the structure or composition of any of the Codexis Enzymes, or modify the Codexis Enzymes in any way. Codexis Enzymes will not be used in humans under any circumstances, and will not be transferred to others outside of Principal Investigator's laboratory except with Codexis' prior written approval. Upon termination or expiration of the Study, Company and Principal Investigator will return any and all remaining quantities of Codexis Enzymes to Codexis.

(b) Company and Principal Investigator understand and agree that the Codexis Enzymes are experimental in nature and should be used with caution and prudence since all of their characteristics are not known. THE CODEXIS ENZYMES ARE SUPPLIED WITH NO WARRANTIES OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

(c) Company and Principal Investigator acknowledge and agree that the Codexis Enzymes are and shall remain the sole property of Codexis.

(d) Company and Principal Investigator agree, to the extent permitted by governing law, to hold Codexis harmless from any claims or liability resulting from use of the Codexis Enzymes, except insofar as such claims or liability arise out of the gross negligence or wrongdoing of Codexis.

Section 3. PAYMENT

The total cost to Codexis for the work under this Agreement (inclusive of direct and indirect costs) is _____ Dollars (US\$_____00) to be paid to Company as follows:

[FILL IN SPECIFIC PAYMENT TERMS; WHAT FOLLOWS IS A SAMPLE APPROACH]

(a) _____ Dollars (US\$_____00) promptly after signing of this Agreement by each of the parties and the Principal Investigator, and receipt by Codexis (attn: Accounts Payable) of an invoice requesting such payment; and (b) _____ Dollars (US\$_____00) promptly after receipt by Codexis (attn: _____) of a satisfactory final report for the Study (as set forth in Section 4) and receipt by Codexis (attn: Accounts Payable) of an invoice requesting such payment. Each check shall include the title of the Study and the name of the Company and the Principal Investigator.

Section 4. REPORT

(a) Principal Investigator will provide a written report to Codexis (to the attention of _____) regarding the work performed under the Research Plan, such report to be due no later than two (2) weeks after such work is completed. All reports shall be considered Confidential Information of Codexis (as defined below), and shall not be provided or disclosed to any party other than Codexis, except that a single copy of the report shall also be sent to Shell at the following address: _____

[Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.]

Section 5. TERM OF AGREEMENT AND TERMINATION

(a) This Agreement shall be in effect from the Effective Date through _____, 200_, unless earlier terminated as provided herein. The parties may extend the term of this Agreement by mutual written agreement.

(b) Either party may terminate this Agreement, such termination to be effective upon thirty (30) days' prior written notice to the other party, for any reason. If such termination is by Company, it shall refund any unused funding promptly to Codexis.

(c) If the Principal Investigator leaves the Company or is unable or unwilling to perform the Services required under this Agreement, Codexis may terminate this Agreement, with such termination to be effective thirty (30) days after written notice to the Company. The Company shall refund any unused funding promptly to Codexis.

(d) If Codexis terminates this Agreement pursuant to Section 5(c), Codexis will reimburse Company for all noncancellable obligations and expenses incurred through the date of termination. The provisions of Sections 2(b), 2(c), 2(d), 6, 7, 8, 10 and this Section 5(d) will survive expiration or termination of this Agreement.

Section 6. CONFIDENTIALITY

(a) Company and Principal Investigator agree to maintain in confidence and not to disclose or transfer to any other party the following: the existence and terms and conditions of this Sponsored Research Agreement; the Research Plan; all data and results of the work under this Agreement; all know-how, practices, processes, patentable and non-patentable inventions arising from the work under this Agreement; and all other information disclosed by Codexis to Company or Principal Investigator under this Agreement, whether in written, oral, graphic or electronic form (collectively referred to as "**Confidential Information**"). Company and Principal Investigator will use the Confidential Information only for purposes of conducting the Study and for no other purpose. Notwithstanding the foregoing, Company may disclose the Confidential Information to those of its employees who need to know such Confidential Information to perform its obligations under this Agreement, provided that such employees agree in writing to be bound by the terms of this Agreement.

(b) Disclosure of Confidential Information shall not be precluded if such disclosure is required under court order or applicable law or regulation, provided that Company first gives written notice to Codexis of the need for such disclosure so that Codexis may seek a protective order or other confidential treatment (if available).

(c) Upon termination or expiration of the Study, Company and Principal Investigator will return any and all Confidential Information to Codexis, except that Principal Investigator may retain one (1) copy solely for archival purposes.

(d) Notwithstanding anything to the contrary, Company and Principal

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Investigator may disclose (i) Confidential Information to the Shell Representative during the conduct of the Study, and (ii) the written report to Shell pursuant to Section 4(a).

{e} Without limiting the generality of the foregoing, Company and Principal Investigator acknowledge and agree that Confidential Information may not be published or disclosed in any scientific or other publication and this Section 6 precludes any such scientific or other publication or disclosure of any Confidential Information.

Section 7. PATENTS AND INVENTIONS

(a) At no additional cost, Company and Principal Investigator hereby assign to Codexis title to all know-how, all patentable and non-patentable inventions, and all other proprietary technology arising from the work under this Agreement or resulting from use of the Codexis Enzymes. Company warrants that each Company employee and other persons, if any, performing work under this Agreement is under obligation to assign all rights in any know-how, all patentable and non-patentable inventions, and all other proprietary technology resulting from the use of the Codexis Enzymes to Company. Codexis is free to use for any purposes information or materials supplied to it under this Agreement, and shall have the option (but not the obligation) to file at its own expense patent applications describing and claiming inventions it believes to be patentable. Company and Principal Investigator agree to cooperate, at Codexis' expense, in filing such applications (if any) and in the prosecution and maintenance of them before patent offices.

(b) No right or license is granted to Company or Principal Investigator with respect to the Codexis Enzymes, either expressly or by implication, other than the right to use the same for the work under the Research Plan in accordance with this Agreement.

Section 8. USE OF NAME

Company and Principal Investigator agree not to use Codexis' name without prior consent, except as necessary to identify Company as the Study site and Principal Investigator when required or desired to do so.

Section 9. NOTICES

Any notice to be given pursuant to this Agreement must be in writing and sent by telecopy or by overnight courier to the addresses set forth below. Notice shall be deemed to have been received on the same business day as telecopy (with machine confirmation of receipt) or three (3) business days following delivery of the document(s) to the courier.

If to Company

If to Codexis

Codexis, Inc.
Attn: General Counsel
200 Penobscot Drive
Redwood City, California 94063
Telecopy: +1 (650) 421-8108

[•] Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

With a copy to:

Telecopy: _____

Section 10. ASSIGNMENT

This Agreement shall not be assigned or otherwise transferred by Company or Principal Investigator to any party without Codexis' prior written consent.

Section 11. MISCELLANEOUS

(a) This Agreement, including **Exhibits A and B**, contains the entire agreement of the parties on the subject matter to which it relates, and supersedes all prior and contemporaneous proposals, discussions, and writings, by and between the parties, on such subject. No commitment or modification hereof shall be valid or binding upon the parties unless made in writing and signed by authorized representatives of the parties. No delay or omission by any party in exercising any right hereunder, at law or in equity, or any otherwise, shall impair any such right, or be construed as a waiver thereof, or any acquiescence therein, nor shall any single or partial exercise of any right preclude other or further exercise thereof, or the exercise of any other right. This Agreement shall be governed by the laws of _____ without regard to its conflict of laws principles.

(b) Company and Principal Investigator represent to Codexis that the terms of this Agreement do not violate and will not cause a breach of the terms of any other agreement or, to Company or Principal Investigator's knowledge, any applicable law, decree or regulations, to which Company or Principal Investigator is a party or by which it is subject or bound. Company and Principal Investigator further covenant that Company and Principal Investigator will not enter into any third party agreement where the terms of this Agreement will violate or cause a breach of the terms of such third party agreement.

(c) This Agreement may be executed in counterparts, each of which shall be treated as an original, but which together shall constitute a single instrument.

(d) **No Third Party Beneficiaries**. The parties to this Agreement do not intend that any terms hereof should be enforceable by any person who is not a party to this Agreement.

IN WITNESS WHEREOF, a duly authorized representative of each party has executed this Agreement as of the Effective Date set forth above.

CODEXIS, INC.

[COMPANY]

(*] Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

By: _____

Name: _____

It: _____

By: _____

Name: _ _ _ _ _

Its: _____

I am the Principal Investigator for the Study described in this Agreement. By signing below, I indicate that I have reviewed this Agreement prior to committing to undertake the Study and agree to comply with the terms and conditions of this Agreement.

Principal Investigator Signature: _____

Name: _____

[*] Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

SCHEDULE A

Series D Stock Purchase Agreement

[*) Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

SCHEDULED

Form of Series E Stock Purchase Agreement

[*] Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

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SCHEDULE C

Form of Amended and Restated License Agreement

[•] Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

SCHEDULED

Warrant Agreement

[*] Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.