

如何完成一件優秀的科展作品

長庚大學醫學院 生化科

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ISEF優秀作品賞析，國際科 展題目趨勢

2016醫學與健康科學

Intel ISEF Best of Category Award of \$5,000

- The "Smart" Cancer Drug: Targeting Cancer's Achilles Heel with Novel CRISPR/Cas9
- Jiwoo Lee, 16, Academy for Medical Science Technology, Hackensack, [New Jersey](#)

First Award of \$3,000

- The "Smart" Cancer Drug: Targeting Cancer's Achilles Heel with Novel **CRISPR/Cas9**
- Jiwoo Lee, 16, Academy for Medical Science Technology, Hackensack, [New Jersey](#)
- Identification of **Thymidine Kinase I** as a Universal Cell Surface **Target** for Treating Cancer and Development of a Novel Antibody Drug Conjugate
- Michael Xiao, 18, Lone Peak High School, Highland, [Utah](#)
- Accelerating **Cancer Immunotherapy**: Optimization of an EGFRvIII-Based Cancer Vaccine via Computationally-aided Analysis of Proteasome Processing for Improved **Glioblastoma** Prognosis
- Anin Sayana, 17, Bellarmine College Preparatory, San Jose, [California](#)

**Second
Award of
\$1,500**

Machine Learning Tool for Early Detection of Small Cell Lung Cancer Using Novel **Nuclear Factor I/B** Expression: Drastically Increase Patient Survival in 1 Minute for 1 Dollar

Jessika Baral, 16, Mission San Jose High School, Fremont, **California**

Novel Selection of Enzymes Loaded in Mesoporous **Nanoparticle** Carrier Engineered to Selectively Target Cancer Cells Using **Aptamer**

Priyanka Jain, 18, La Cueva High School, Albuquerque, **New Mexico**

The Effects of **Near Infrared Light** and **Curcumin** on Wound Healing and Tissue Regeneration in *Girardia tigrina*

Aarushi Iris Pendharkar, 14, Massachusetts Academy of Math and Science, Worcester, **Massachusetts**

Examining the **Coding** and **Non-Coding** Regions of **Enhancer** Landscapes in Vascular Smooth Muscle Cells (VSMCs) Stimulated with Angiotensin(**血管收缩素**) I II

Varun Mandi, 18, Troy High School, Fullerton, **California**

The Smoking Gun: Toxicological Effects of **Electronic Cigarettes** on Epithelial Cells using Air Liquid Interface, Year Two

Ralph Ignacio Lawton, 17, Pennsylvania Leadership Charter School - University Scholars Program, West Chester, **Pennsylvania**



Inhibitory Effects of **Omega-3 Fatty Acids**-Based Fish Oil on Cholangiocarcinoma

Metalloprotease Inhibitors as Lead Candidate Drugs to Treat Lymphatic Filariasis (象腿_淋巴性絲蟲症) and Other Roundworm Infections

CRISPR Based **Gene Editing** Confers Resistance to Human Immunodeficiency Virus (HIV)

A **Novel Method** of Early Detection of **Arteriosclerosis** (動脈硬化): Analyzing the Effect of Arterial Stiffness and Arterial Clogging on Blood Pressure during Systolic-Diastolic Cardiac Cycle

Caerin 1.9: A Possible Treatment for Alzheimer's Disease? Investigating the Effects of the Caerin 1.9 Peptide on Amyloid-beta Aggregation and Phagocytosis by Cultured Microglia

A Novel Mechanism of **Chloroquine** (氯奎寧) in Cancer Therapy

The Effect of Crataegus songarica (山楂) Extract on Proliferation and Apoptosis in HCT116 and SW480 Colon Cancer Cells

Targeting Mistranslation in Cancer and Neurodegenerative Disease Therapies

2016 動物學



**Intel ISEF Best of
Category Award of \$5,000**

- **Shining a Light on the Blind: Evolutionary Regression and Adaptive Progression in the Micro-vertebrate *Ramphotyphlops braminus* (鉤盲蛇), a Model for Understanding Brain Organization and Complex Neurological Disorders**
- River Grace, 16, West Shore Junior/Senior High School, Melbourne, **Florida**

First Award of \$3,000

- **Shining a Light on the Blind: Evolutionary Regression and Adaptive Progression in the Micro-vertebrate *Ramphotyphlops braminus*, a Model for Understanding Brain Organization and Complex Neurological Disorders**
- River Grace, 16, West Shore Junior/Senior High School, Melbourne, **Florida**

Second Award of Animal Sciences 動物學科二等獎

The Bee's Knees: The Effect of [Secondary Metabolites](#) in Place of Neonicotinoid (新菸鹼類) Pesticides on *Apis mellifera* (西方蜜蜂) and *Drosophila melanogaster*

- Austin Wolfgang Katzer, 16, Jasper High School, Plano, [Texas](#)
Jason Tanner Smith, 16, Jasper High School, Plano, [Texas](#)

Geospatial Analysis of [Cetacean](#) (鯨類) Distribution and Habitat Utilization Related to Prey Density and Sea Surface Temperature off the Long Island, New York Coastline

- Jared Randolph Bergen, 18, Sayville High School, West Sayville, [New York](#)

A Silk Sheath Production Frame Developed from Negative Geotropic Spinning (紡織) Behavior of Silkworms (蠶) Resulted in Silk Sheath with High Homogeneity

- Charuntorn Doungnga, 18, Damrongratsongkroh School, Chiang Rai, [Thailand](#)
Runglawan Charpugdee, 17, Damrongratsongkroh School, Chiang Rai, [Thailand](#)

Third Award of Animal Sciences 動物學科三等獎

Spotted Wing Drosophila (invasive insect), Baiting and Trapping

- Hannah Nicole Lee, 16, The Bolles School, Jacksonville, [Florida](#)

Inheritable [Longevity Programming](#): First Epigenetic Mechanism and Proof-of-Concept for [Transgenerational Therapies](#) to Prevent Multiple Aging-Related Diseases with Single Molecules

- Brian Xia, 16, Canyon Crest Academy, San Diego, [California](#)

Slaying (殺害) the Destructor, Part II: Dosage Optimization and Effects of Oxalic Acid (草酸) on Honeybee Hives (蜂窩)

- Emily Elizabeth Llaneras, 17, Southwest Virginia Governor's School, Pulaski, [Virginia](#)

Bubble Nesting Behavior Behind Local Wisdom of Rearing Siamese Fighting Fish (泰國鬥魚) by Utilizing Dry Leaves

- Puvanat Triamchanchai, 15, Bangkok Christian College, Bangkok, [Thailand](#)
- Touchakorn Chintavalakorn, 15, Bangkok Christian College, Bangkok, [Thailand](#)

2016 生物化學

**Intel ISEF Best
of Category
Award of \$5,000**

**First Award of
\$3,000**

**Highly Sensitive Single Mutation Detection of
EGFR by Bridged Nucleic Acid**

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EGFR by Bridged Nucleic Acid**

Edward Sangyoon Kim, 16,
Midway High School,
Waco, **Texas**

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Midway High School,
Waco, **Texas**

**Structural and Kinetic Analysis of Methicillin-
resistant Staphylococcus aureus MenE (抗藥
性金黃葡萄球菌), an acyl-CoA Synthetase of
the Bacterial Menaquinone Biosynthesis
Pathway as a Novel Antibacterial Target**

Kameron Sedigh, 17,
Kings Park High School,
Kings Park, **New York**

**Second Award of
\$1,500**

Inhibition of the **Amyloid Processing Pathway
by Micronutrients: A Systematic Genome-
Wide Chemical Repositioning Approach to
Counteract **Alzheimer's** Pathology**

Swathi Ravi Srinivasan, 16,
Beachwood High School,
Beachwood, **Ohio**

**The Role of NF-E2 (轉錄因子) in Regulating
Chemotherapeutic Metabolite Acrolein-
Induced **Nephrotoxicity****

Sanjana J. Rane, 18,
duPont Manual High
School, Louisville,
Kentucky

Third Award of Biochemistry 生物化學科三等獎

Modeling the Structures of Disease-Causing ACVR1 Mutants (進行性骨化性肌炎) Using Ab Initio (電腦模擬) Methods

- Nicholas Joseph Freitas, 17, Massachusetts Academy of Math and Science, Worcester, [Massachusetts](#)

Does Gotu Kola (Centella asiatica 雷公根) or Moringa (Moringa oleifera 鼓槌樹) Have an Effect on ALS Flies (肌萎縮性脊髓側索硬化症)? 漸凍人(運動神經元疾病)

- Ashara Naomi Somawardana, 14, Basis San Antonio Medical Center, San Antonio, [Texas](#)

Investigating Interfacial 界面的 Cross Linking to Combat Hard Foulants 污垢: An Experimental Study on Enzymatic Activities of the Balanus amphitrite (紋藤壺)

- Christina So-Ye Oh, 17, Thomas Jefferson High School for Science and Technology, Alexandria, [Virginia](#)

Assessment of Macro and Micro-Nutrients in a Recycled Supplement for Canines 犬的

- Alexis Jones, 16, Auburn High School, Auburn, [Alabama](#)

2016 植物學

**Intel ISEF Best of
Category Award of
\$5,000**

- **Comprehensive RNA Profiling Identifies Novel Blackleg Resistance Genes in Canola (芥花油)**
- Dennis Adrian Drewnik, 17, Sisler High School, Winnipeg, [Canada](#)



First Award of \$3,000

- **Plant Tissues that Fail to Regenerate Undergo Early Steps of Remodeling but Fail to Induce a Cytokinin Hormone Response**
- Charlotte Underwood Keeley, 17, Ossining High School, Ossining, [New York](#)
- **Comprehensive RNA Profiling Identifies Novel Blackleg Resistance Genes in Canola**
- Dennis Adrian Drewnik, 17, Sisler High School, Winnipeg, [Canada](#)

植物學二等獎

**Second
Award of
\$1,500**

Dressing the Seed: A Comprehensive, Wide-Scale Approach to Food Insecurity

Alon Millet, 18, Bergen
County Academies,
Hackensack, **New Jersey**

**Molecular-Based Genotyping of *Lactuca sativa*
for Accelerated Genotypic Selection**

Sophia Edith Swartz, 16,
Central Bucks High School
South, Warrington,
Pennsylvania

**Determining the Effect of the Novel CarL2
Strigolactone Analog on the Seed Germination
of Parasitic Weeds 寄生雜草**

Fatimah Abdulmonem
Alshaikh, 18, AlFaisaliah
Islamic Schools, Khobar,
Saudi Arabia



植物學三等獎

Innovative Strategy using Endophytes 內部寄生植物 for Effective Biocontrol of Insect Pests in Cotton

- Suhani Sachin Jain, 15, Centre Point School, Nagpur, [India](#)
- Divya Kranthi, 16, Centre Point School, Nagpur, [India](#)

Asian Lady Beetles 亞洲瓢蟲...Infestation or Curation? A Novel Study to Evaluate the Efficacy of Harmonia axyridis 異色瓢蟲 Hemolymph 體液 as a Pesticide to Control Diaphorina citri (Asian Citrus Psyllid) 柑橘木蝨, and as an Antibiotic against the Huanglongbing Disease 柑橘黃龍病 Causing Liberibacter!

- Rowan Said ElQishawi, 17, Hoover High School, Hoover, [Alabama](#)
- Rozan Said ElQishawi, 16, Hoover High School, Hoover, [Alabama](#)

Turning the Red Planet Green: Study of Cyanobacteria/Algae 藍綠藻 Growth Kinetics Coupled with Hydroponics 水耕法 Applications for Terraforming 外星環境地球化 and Settling on Mars

- Andrew Dong-Hyun Kim, 16, The Woodlands College Park High School, The Woodlands, [Texas](#)

The Green Algae, Chlorella vulgaris 綠球藻, Mitigates 緩和 Detrimental Effects of Methylmercury in Zebrafish

- Jay Maturi, 16, University High School of Indiana, Carmel, [Indiana](#)

Tracking the Spread of Potato Late Blight (Phytophthora infestans 晚疫病) on a Regional Scale

- Benjamin Firester, 16, Hunter College High School, New York, [New York](#)

2016 微生物學

**Best of
Category
Award of
\$5,000**

- **Boosting **Microbial Fuel Cells** Biocatalyst Performance: A Novel Gene Identification and Consortia Engineering Approach**
- Han Jie (Austin) Wang, 18, David Thompson Secondary, **Vancouver, Canada**

「推動微生物電池催化表現：新的基因鑑定和群落工程研究」
(Boosting MFC Biocatalyst Performance: A Novel Gene Identification and Consortia Engineering Approach)，是研究利用細菌加快把有機廢物，轉化為電力。



**First
Award of
\$3,000**

- **Creating an Organic Pesticide to Save the North American **Ash Trees****
- Nick A. Wamsley, 16, Home School, Pacific, **Missouri**
- **Boosting Microbial Fuel Cells Biocatalyst Performance: A Novel Gene Identification and Consortia Engineering Approach**
- Han Jie (Austin) Wang, 18, David Thompson Secondary, **Vancouver, Canada**

微生物學 二等獎

Second Award
of \$1,500

Analysis of the **Antimicrobial** Efficacies and Structural Characteristics of Fractional Components of Selected **Algal Extracts**

Beau Taylor Bingham, 16, Cascia Hall Preparatory School, Tulsa, **Oklahoma**

Microfluidic Analysis of E. coli Thermotaxis

Ariel Slepyan, 18, George W. Hewlett High School, Hewlett, **New York**

A Novel Approach to the **Reduction of Antibiotic Resistant** Escherichia coli Present in Livestock Waste through Use of Plant Extracts

Sarah Kay Strickler, 18, Bonney Lake High School, Bonney Lake, **Washington**

Point of Care Testing for **Malaria** Using a Smartphone and a Microfluidic ELISA System

Nikhil Sajan Gopal, 15, The Lawrenceville School, Lawrenceville, **New Jersey**

Reversing **Antibiotic-Resistance**: Discovery, Evaluation, and Optimization of Extended-Spectrum **Beta-Lactamase** Inhibitors

David M. Lu, 18, Mills E. Godwin High School, Henrico, **Virginia**

微生物學 三等獎

Third Award
of \$1,000

GASP!: Growth Advantage in Stationary Phase in Acinetobacter baylyi (革蘭氏陰性菌)

Rebecca Bloomfield, 17, William J. Palmer High School, Colorado Springs, **Colorado**

Enhancement of Beta-lactam Antibiotic Susceptibility by Tannic Acid through Beta-lactamase Inhibition

Justin Kim, 16, Jericho High School, Jericho, **New York**

Methanogenerate! A Methanogen-Methanotroph Carbon Recycler

Wesley Sheker, 18, Harrisburg Academy, Lemoyne, **Pennsylvania**

Tracing Evolutionary Patterns in West Africa: A Phylogenetic Analysis of the HIV-1 and HIV-2 Strains

Vivek Bhupatiraju, 14, Lexington High School, Lexington, **Massachusetts**

The Identification of ATPase Activity Regulation in Tetrahymena thermophila: Understanding the Function of the Malarial ATP Synthase in Order to Develop New Antimalarials

Rachana Mudipalli, 17, Downingtown STEM Academy, Downingtown, **Pennsylvania**

Engineering of a Conjugated Endolysin 細胞內溶素 as an Efficient Method for Acne Treatment

Sepehr Asgari, 15, Carmel High School, Carmel, **Indiana**

Nano Is Novel: Improving Antibiotic Efficacy for S. epidermidis with Structurally Modified Silver

Afeefah Fatimah Khazi-Syed, 16, Harmony School of Innovation-Fort Worth, Fort Worth, **Texas**

如何完成一件優秀的科展作品

如何贏得科展？

1. 找到合適之指導老師

2. 篩選出想做科展的適當學生

3. 提出適當的題目 -

- 有假說性的，新穎的
- 應用性，能解決問題
- 分子層次，有機轉探討
- 完整實驗記錄

4. 學會一些必備的實驗技術

5. 閱讀歷屆科展的論文

6. 學習論文寫作

7. 增強專業知識

8. 增強英文能力

做科展的注意事項

1. 沒有完整的研究計畫，或結論
2. 沒有掌握實驗方法
3. 實驗僅限於現象觀察，沒有機制探討
4. 實驗技巧欠佳，無親自操作
5. 沒有創新性，重覆別人已做過或類似的題目
6. 專業知識太薄弱，不懂得實驗原理
7. 不了解科學展覽會參展安全規則：
 - 不得有虐待動物
 - 有害微生物及危險性生物
 - 劇毒性、爆炸性、放射性、致癌性或引起突變性及麻禁藥之物品

論文架構

1. 摘要 (Abstract) :

將整個研究的主要結論，以簡短文字來加以表達。

2. 背景介紹 background

3. 研究動機 (Motivation) :

將進行此一研究的動機、目的寫下。

4. 研究方法與設備 (Method & Material) :

進行研究的方法、設備。

5. 研究結果與討論 (Results & Discussion) :

將研究結果以圖表方式有系統的呈現，並且針對研究結果，進行討論。

研究結果與討論可分開撰寫。

6. 結論 (Conclusion) :

針對最重要實驗結果，提出結論。

7. 參考文獻 (References)

現場表現

- 1. 事前充分準備
- 2. 有禮貌，專業形象
- 3. 口齒清晰，條理分明， 掌握時間，不急不徐
Aims, Method (Strategy), Results, Discussion,
Application.
- 4. 事前準備好可能問的問題

謝謝聆聽 敬請指教