

中華民國第二屆全國中小學科學展覽會報告

REPORT ON THE NATIONAL SCIENCE EXHIBITION
1961
THE REPUBLIC OF CHINA

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館圖書室

中華民國中小學科學展覽會設計指導委員會編印

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中華民國第二屆全國中小學科學展覽會報告

REPORT ON THE SECOND NATIONAL STUDENTS SCIENCE EXHIBITION

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一、前 言

我國中小學科學展覽會自民國四十九年度首次舉辦以後，各方面反應良好，以展出結果獲得意外的成功，引起社會的重視。科學教師為指導學生製作展品也運用了各種方法輔導學生進行個別研究實驗計劃，使教學指導方法有了重大的改進。學生們也因此對科學研究工作發生濃厚的興趣，除了照傳統的方法研讀教科書及實驗室中依照實驗手冊作實驗外，更能按照個別志趣，選定題目，在教師指導下，進行調查、採集、觀察、分析、記錄、實驗、檢討、改進、報告等工作，展開了學習科學的新方向。確已達到當初舉辦科學展覽會的預定目的，咸認有繼續舉辦之必要。

本年度在各方面通力合作之下，舉辦第二屆中小學科學展覽會，復承亞洲協會之熱心贊助，得以順利推進。其舉辦宗旨經詳加研議後修訂為下列五項：

- (一) 激發學生研習科學之興趣。
- (二) 培養學生對科學實驗之正確觀念。
- (三) 啓發學生科學思考與創造能力，藉以發掘科學天才。
- (四) 增加師生研習科學之機會與促使教師改進教學方法。
- (五) 促使社會人士重視科學並協助科學教育之發展。

1. FOREWORD

The National Students Science Exhibition 1960, was regarded with esteem on account of its excellent results. Teachers as well as students showed great interest in science. In directing the students in the preparation for the exhibits, the science teachers endeavoured to improve the teaching methods and to stimulate interest in the classes. In addition to the conventional methods of study in the science classes and laboratories, students were able to select their subject matters in which they were interested, and learned to investigate, collect, observe, analyze, test, discuss, improve record and report their work in a new way of studying modern science. It was thought that the Science Exhibition had achieved its goal as planned and ought to be held periodically.

Through the cooperation of the agencies concerned and the assistance of Asia Foundation, the Second National Students Science Exhibition was held successfully. The objectives of the exhibition were as follows:

- (1) To stimulate interest in science among the students.
- (2) To cultivate the proper attitude in regard to scientific experiments among students.
- (3) To develop creative thinking in science so as to discover science talent.
- (4) To provide more opportunities for teachers and students to study science and improve the teaching methods.

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其展覽內容仍以生物、化學、物理、數學、工程、自然及中小學其他理論及應用科學為準，凡此範圍內之成績如下列各項，均得參加展出：

- (一) 未經發表之科學研究成果。
- (二) 科學原理定律或觀念之闡釋。
- (三) 對科學有關資料之收集與整理。
- (四) 表明工程及技術之過程。
- (五) 機器模型或科學儀器製作。
- (六) 科學實驗之新操作或演示。

二、展出經過及實況：

一、展出經過：

(一) 成立第二屆科學展覽設計指導委員會：籌辦本屆中小學科學展覽會第一次座談會，於五十年四月三日在教育部第二會議室舉行，由教育部邀請有關單位初步研商，成立第二屆中小學科學展覽會設計指導委員會，主任委員仍公推李熙謀先生擔任，其委員由下列各單位代表組成之；中國工程師學會、中華科學協進會、中國自然科學促進會、中國理化教育學會、中國化學會、中國物理學會、中華醫學會、教育部科學教育委員會、中等教育司、國民教育司、台灣省政府教育廳、福建省政府、國立台灣科學館。

(二) 修改舉辦計劃經費預算及洽請亞洲協會捐助展出經費：教育部依據上屆科展會舉辦之經驗並檢討其得失，修正本屆科展會舉辦計劃草案與經費預算表，提經設計指導委員會通過後，函請亞洲協會捐助展出經費，旋即獲得亞洲協會駐中華民國代表派克先生之欣然同意。

(三) 辦理科展會之機構：

- (5) To call the attention of the public to the importance of science and to inspire their cooperation in the development of science education.

The exhibits included theoretical and applied science in biology, chemistry, physics, mathematics, engineering, and the natural sciences in the field of secondary and elementary education. Each exhibit should conform to at least one of the following criteria:

- (1) Unpublished results of scientific study.
- (2) Illustrations on science concepts, theories and ideas.
- (3) Collection of data for science study.
- (4) Illustrations on engineering or technical concepts.
- (5) Models of machine or scientific apparatus and instruments.
- (6) Demonstration of new methods of manipulation and scientific experiments.

2. PREPARATION AND IMPLEMENTATION OF THE EXHIBITION

1. Preparation

- (A) Formations of the Second Students National Science Exhibition Council

On April 3, 1961, the preliminary conference for the Second National Student Science Exhibition was held at the Ministry of Education with the participation of the various agencies concerned. In the conference the Second Students National Science Exhibition Council was organized. Dr. S.M. Lee, chairman of Science Education Council was selected as the chairman of the council again. Members of the Council were representatives from the following agencies: Chinese Institute of Engineers, Chinese Association for the Advancement of Science, Chinese Association for the Advancement of Natural Science, Chinese Association

(1)承辦單位：國立台灣科學館。

(2)贊助單位：新聞界及實業界有關單位。

(3)協辦單位：展覽會有關事宜由教育部，國立台灣科學館共同負責辦理；縣市展覽會由台灣省教育廳負責督導；金馬地區展覽會由福建省政府負責督導。至於輔導工作則由教育部，台灣省政府教育廳與各學會共同負責。

(四)編印參考資料集及宣傳海報：為使一般中小學校教師及學生進一步了解科學展覽會的意義在發展科學教育，促使教師改進教學方法，培養學生研習科學興趣起見，乃依據第一屆科學展覽會之成果，配合本屆設計指導委員會修正通過之舉辦計劃（本屆之舉辦計劃是綜合上屆之舉辦計劃、舉行辦法及送展須知等合編而成），編印「中華民國第二屆中小學科學展覽會參考資料集」一種（附件一），印刷二萬二千冊，分發各中等學校及國民學校。參考資料集之主要內容如下：

(1)中華民國第二屆中小學科學展覽會舉辦計劃。

(2)美國科學展覽會手冊。

(3)學校科學展覽會工作及目標一覽表。

(4)我國第一屆科展會之回顧。

(5)中華民國第一屆全國科學展覽會優勝展品照片集。

同時為使一般社會人士瞭解科學展覽會之意義與內容起見，復將舉辦計劃印成大幅海報（附件二）五千份，張貼各公共場所及文化機構，以廣宣傳。

(四)撥發各縣市科學展覽會補助款：為便

or Physics and Chemistry Education, Chinese Chemistry Association, Chinese Physics Association, Chinese Medical Society, Science Education Council of the Ministry of Education, Department of Secondary Education and Department of Elementary Education of the Ministry of Education, Provincial Department of Education, Provincial Government of Fu-kien and National Taiwan Science Hall.

(B) Budgeting and Financing through Asia Foundation

Based on the experience of last year, staff of the Ministry of Education revised the plan and budget of exhibition, and submitted it to the Exhibition Council for approval. With the concurrence of the council the approved plan and budget were transmitted by the Ministry of Education to the Asia Foundation for financial support. Mr. Pike, the representative of Asia Foundation in China, immediately concurred in the grant.

(C) Sponsoring Agencies

1) Operating Agency — The National Taiwan Science Hall

2) Promoting Agencies — Various new agencies and industrial firms interested in the promotion of science.

3) Cooperating agencies — The National Science Exhibition was implemented by the Ministry of Education and National Taiwan Science Hall. County and city exhibitions were supervised by the Provincial Department of Education, while the exhibitions in the Kinmen and Matsu areas were sponsored by the Provincial Government of Fu-kien. General advises were obtained from the Ministry of Education and various professional associations.

利各縣市教育科局積極籌備全縣市科學展覽會計，設計指導委員會曾提前將該項補助經費新台幣拾萬元，撥交台灣省政府教育廳轉發各縣市政府備用；並參照各縣市中小學校班級學生數，由教育廳酌予分配，每縣市約獲得三千元至五千元。

二、展覽實況：

(一)各中小學舉行預展：各中等學校及國民學校於展品製成後，分別於五十年九月十五日前，舉行學校科學展覽會，一面選拔優良展品參加各縣市科學展覽會；一面獎勵優良展品之製作學生與指導教師及學校，以資鼓勵。

(二)縣市科學展覽會：台灣省所屬二十二縣市局及福建省金、馬兩縣，分別於五十年九月二十五日前，舉辦全縣市局之科學展覽會，聘請專家擔任評判；按照下列四組，每組各選送最優作品前三名參加全國科學展覽會。

(1)初小組：小學一年級至四年級學生作品。

(2)高小組：小學五年級至六年級學生作品。

(3)初中初職組：初中及初級職業學校學生作品。

(4)高中高職組：高中及高級職業學校學生作品。

(三)全國科學展覽會：

(1)搜集展品與佈置會場：參加展品於五十年十月五日全部送達台北市國立科學館，當即連夜趕工，佈置會場與陳設展品；國民學校部份陳列在科學館一樓與二樓，中學部

(D) Publication of Reference Materials and Posters

Based on the results of the National Students Science Exhibition, 1960, and the revised plan approved by the Exhibition Council 22,000 copies of the Chinese Students Second Exhibition reference materials and posters were printed (see Attachment 1) and distributed to schools to give teachers and students a thorough understanding of the significance of the science exhibition. These publication helped in improving the teaching methods for the science teachers, and stimulating the interest among students in science. Contents of the manual on the National Students Science Exhibition, 1961, were as follows:

- (a) Regulations for the Science Exhibition.
- (b) Rules for an American Science Fair.
- (c) Flow chart showing objectives and procedures for the Science Exhibition.
- (d) Memoranda of the Science Exhibition, 1960.
- (e) Titles of exhibits in Science Exhibition, 1960.
- (f) Snaps and illustrations of outstanding projects in Science Exhibition, 1960.

5000 copies of colored posters were printed for advertisement to be posted to call the public attention and to inspire their cooperation for the development of science.

(E) Funds for City and County Students Science Exhibitions

A sum of NT\$100,000 was appropriated to the county and city governments to meet the expenses of the local exhibitions through the distribution of the Provincial Department of Education. A grant of NT\$3000 to NT\$ 5000 was distributed to each county and city in

份陳列在科學館三樓；展覽桌均係特別設計製就，以便於參觀。各縣市所送展品件數計初小六十六件，高小七十三件，初中初職七十九件，高中高職七十三件，合計二百九十一件，經編印中華民國第二屆中小學科學展覽會目錄（附件三），分贈參觀人士。

(2)延聘專家評判：本屆科學展覽會之評判人員，多係延請從事研究科學教育之專家學者擔任；中等學校分為物理、化學、生物、數學四組，展品評判為戈定邦先生、劉拓先生、居載春先生、蘇林官先生、范傳坡先生、方子衡先生、于濟昌先生、孫樂山先生。國民學校分為高小與初小兩組，展品評判為王友燮先生、羅宗輝先生、李國琛先生、錢卓升先生、朱匯森先生、嚴慶潤先生、陳梅生先生、夏起晉先生。評判時作者均立於



開幕典禮暨頒獎式會場



教育部黃部長頒發獎品

proportion to the total number of classes and students in their secondary and elementary schools.

2. Implementation

(A) School Science Exhibitions

School science exhibition was held individually by September 15, 1961. Outstanding exhibits were selected for competition in county and city exhibitions. Awards were given to the winning students and directing advisory teachers.

(B) County and city Science Exhibitions

In Taiwan province 22 counties and cities held their individual science exhibitions by September 25, 1961, and so with Kinmen and Matsu of Fukien province.

Scientists or experts were invited to select the best three exhibits from each of the following school level categories:

1) Category I, (Lower elementary) — Exhibitions by students from grade 1 to 4.

2) Category II, (Upper elementary) — Exhibits by students from grade 5 to 6.

3) Category III, (Junior high) — Exhibits by junior high and junior vocational schools, grade 7 to 9.

4) Category IV, (Senior high) — Exhibits by senior high, normal, and senior vocational school students, grade 10 to 12.

(C) National Science Exhibition

1) Display of Exhibitions

All the selected exhibitions were assembled on October 5, 1961, at the National Taiwan

展品旁，以備評判員之詢問。

(3)徵集獎品及製作獎狀獎章：設計指導委員會，為獎勵優良學生、指導教師及學校，除由本會自行購備部份獎品外，並函請各界贊助單位及主管教育行政機關捐贈獎品。同時本會將上屆自行設計印刷之獎狀三種，以備頒發獎品製作學生、指導教師及所屬學校之用。另訂製獎章一種，頒發所有參加全國性展覽會得獎之學生、指導教師及學校。

(4)邀請各界人士參觀：設計指導委員會分函邀請各界人士屆時前往參觀，同時參加開幕典禮。

(5)開幕典禮與頒獎：五十年十月十日下午三時，全國第二屆中小學科學展覽會假國立藝術館舉行開幕典禮，由教育部部長黃季



中外首長演講

Science Hall in Taipei. Elementary exhibits were displayed on the main and the second floors, and the secondary level exhibits were on the third floor. Tables were made with special design and arranged in circular fashion to accommodate the flow of visitors. The total number of exhibits was 291 and classified as:

Lower elementary	---	66
Upper elementary	---	73
Junior high	---	79
Senior high	---	73

List of exhibits was distributed to visitors.
(See attachment III)

2) Judging

Science specialists and experts on science education were invited to be the judges for the National Science Exhibition. The exhibits of the secondary level were classified into four categories, namely: physics, chemistry, biology and mathematics. The judges invited were Ko Ting-pong, Liu Tou, Che Tsai-chun, Su Lin-kuan, Fan Chuan-po, Fong Tze-wei, Yu Chi-chang and Dr. Saint Rossy. Those for elementary level were Wang You-hsieh, Lo Chung-wei, Lee Kou-sheng, Chien Tsu-shen, Chu Huei-shen, Yen Ching-juen, Chen Mai-shen, and Hsia Chi-chuen. Students Participating stood before their exhibits, ready to answer questions put forward by the judges.

3) Awards, Certificates and Medals of Honor

Awards for the winners were donated by the agencies concerned and the organizations of education, science and industry in addition to those prepared by the Exhibition Council. Special certificates of honor were presented to the students, teachers and schools of winner. Medals of honor were distributed to the par-

陸主持，邀請亞洲協會駐中華民國代表派克先生、台灣省政府教育廳長劉真分別演講，到有各界來賓及學生代表千餘人。同時由黃部長頒發給優勝人員及學校，其獎品異常豐富。

典禮完畢後，即循序引導來賓參觀展品，當時觀眾已甚擁擠。展覽時間十天，據科學館統計全部觀眾約四萬三千九百九十四人（其中計成人一萬一千三百六十八人，學生三萬零三百九十三人，軍警一千零八十八人，兒童一千一百五十三人）。



展覽會場之一角

三、優勝展品介紹：

經詳判錄取獲獎之展品共二十名；其中國民學校十名，中等學校十名。除此之外，佳作仍多，評判委員會特再選出國民學校二十七件，中等學校三十一件，不分名次，亦不給獎，作為錄取之作品，以示鼓勵。茲將各組優勝之展品照片、展品製作者、指導教師、學校及校長姓名、研究目的與結果分別介紹於后。

ticipants (students and directing advisory teachers) in the National Science Exhibition.

4) Invitations

Prominent persons in the community were invited to attend the opening ceremony and visit the Exhibition afterwards.

5) Opening Ceremony and Awards Presentation

The opening ceremony of the National Science Exhibition took place in the National Taiwan Arts Hall at 3:pm, Oct. 10, 1961, under the chairmanship of His Excellency Mr. Huang Chi-lu, the Minister of Education. Guest speakers included Mr. Edgar Pike, the Representative of Asia Foundation, and Mr. Liu chen, Commissioner, Provincial Department of Education. There were more than one thousand attending including guests and representatives of students from various schools. Awards were presented to the winner students and schools by the Minister of Education. Guests were invited to visit the Exhibition. According to the statistics made by the Science Hall the total number of visitors were 43,994 (including 11,368 adults, 30,393 students, 1080 military personnel, and 1153 children.)

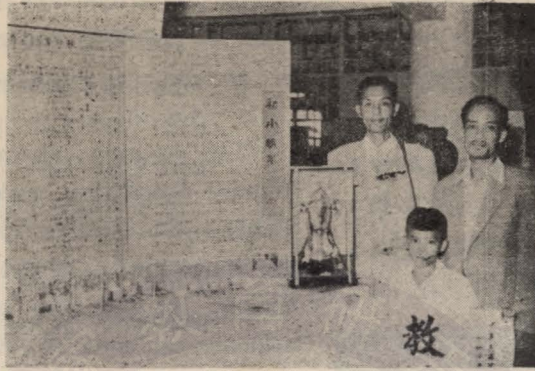
3. PRIZE-WINNING EXHIBITS

Twenty outstanding exhibits were selected as the outstanding works in the Exhibition, ten from the elementary level and ten from the secondary level. Moreover, 27 exhibits from the elementary level and 31 from the secondary level were considered to be rather good being award "Honorable Mentioning" in the Exhibition.

Names of Schools Principals, directing-teachers and students together with the purposes implementation and results of their winning exhibits were described as follows:

蒼蠅的實驗 AN EXPERIMENT ON FLIES

國民學校初小組第一名
First Award of the Lower Elementary



一、展品製作者：莊謙仁等十一人。

二、指導教師：王大泳先生。

三、學校：台灣省立台中師範學校附屬小學
校長：王清河

四、實驗目的：

1. 觀察常飛來廚房裏的果蠅（小蒼蠅）有幾種。
2. 觀察果蠅的形體，食物，生活情形和大蒼蠅有何不同。
3. 將實驗的結果，做我們的科學知識並供科學家參考。

五、實驗結果：

1. 飛進廚房裏的果蠅有四種。
2. 果蠅每次所生的卵非常的多，不容易數，並且很小，不容易看出來。其繁殖力既快又多。
3. 果蠅所生的卵色白並有蛆的形狀，三日內能成蛆。成蛆後五日內長成0.4公分就要結蛹（比大蒼蠅的蛆早兩日），結蛹後五日就能變成小果蠅。成虫後五日內就交尾。
4. 果蠅在玻璃瓶內，能繼續生殖數代。
5. 在瓶內所生的果蠅同空中飛的果蠅，其形色都一樣。

1. Pupils: Chuan Chien-jen and his ten classmates.

2. Director (teacher) Wang Dar-yuen

3. School: The Affiliated Elementary School of the Provincial Taichung Normal Junior College

Principal: Wang Tseen-ho

4. Observation:

- (1) To observe various kinds of flies we often see in the kitchen.
- (2) To witness the propagation and growth of flies.
- (3) To add to our stock of scientific knowledge and to distribute the result of the experiment to scientists for their reference.

5. Results:

- (1) we found four kinds of flies and kept them in different bottles.
- (2) Fly lays a mass of very small eggs each time.
- (3) The eggs are white and similar in shape of maggots. They become maggots within three days.
- (4) Maggots develop into chrysalises within five days.

6. 果蠅需在液量充分的飼料中才產卵。
 7. 小紅眼果蠅的走步小，速度快，小灰眼果蠅的走步也小，但速度更快。
 8. 小灰眼果蠅有鑽小空隙能力，而小紅眼果蠅卻不能。
 9. 小紅眼果蠅喜吃香蕉、麵包、米水、米糠、米酒、豆醬和醋等。小灰眼果蠅喜吃米水、米糠、醃瓜、醬油等。
 10. 龍眼肉內的小蛆是紅眼果蠅生的。
 11. 香蕉米糠加米水誘來果蠅最快（三分鐘），並最易使其繁殖，但在人尿加石灰內果蠅不願進入生殖。
- (5) Dry place suits for chrysalises.
 - (6) Chrysalises develop into flies within five days.
 - (7) Young flies copulate after five days.
 - (8) Flies fed in bottle can propagate several generations.
 - (9) Flies fed with damped food propagate faster and multitudinous.
 - (10) Flies like eating fruits, paddy chaff, rice-water, salted cucumber, sauce etc.
 - (11) Sour taste allures flies most.

蝸牛的生活

LIFE OF SNAILS

國民學校初小組第二名

Second Award of the Lower Elementary Level



一、展品製作者：黃琳祥等二人。

二、指導教師：藍永聰先生。

三、學校：台灣省宜蘭縣順安國民學校。

校長：朱錫堽

四、研究目的：

1. 研究蝸牛的卵從身體上什麼位置生出來，每次生多少個。

2. 觀察蝸牛的生活情形以及它如何長大。

五、實驗結果：

1. Pupils: wang Lin-chiang, Chen Su-liang

2. Directing teacher: Lan Yin-tsung

3. School: The Chun-an Elementary School, Ilan Hsien.

Principal: Chu Hsi-wang

4. Objectives:

(1) To study the way in which a snail lays eggs and how many eggs does a snail lay each time.

(2) To observe how their eggs become baby snails.

1. 蝸牛的卵由脖子生出來，每次所生的數量不一，最少的七十個左右，多的有五百餘個，與它的體積或正比例。
2. 蝸牛卵孵化的時間與氣溫有關，氣溫低需要十八至二十天孵化，氣溫高只要十二至十三天孵化。
3. 蝸牛出生後除吃東西以外，都是生活在土裏，經過八十天以後，才完全在地面上生活。
4. 蝸牛體積長大，從脖子開口處生新殼衣。
5. 蝸牛不吃東西可以活很久。
6. 蝸牛翦掉眼睛後經過六十多天仍會長出來。
7. 蝸牛的大便從開口後面的一個小洞排洩出來。
8. 出生後一個多月的蝸牛，平均每分鐘呼吸五十至六十次。

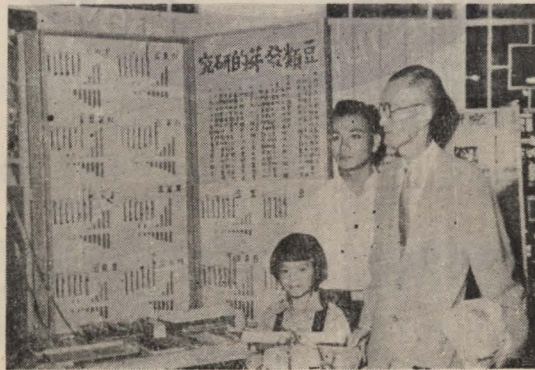
5. Results

- (1) Snails lay their eggs from their necks.
- (2) Air temperature has great influence on the eggs hatching.
- (3) Baby snails live underground for about 80 days.
- (4) Snails change their shells several times in growing.
- (5) Snails can survive several months without eating.
- (6) If a snail's eyes be cut off, it will grow a pair of new eyes after 60 days.
- (7) Snails discharge feces from anus near the shells.
- (8) One-month-old snail breathes 50 to 60 times per minute.

豆類發芽的研究 A STUDY OF BEAN-SPROUTS

國民學校初小組第三名

Third Award of the Lower Elementary Level



- 一、展品製作者：鄭雅心等十六人。
- 二、指導教師：林重孝先生，許榮得先生。
- 三、學校：台灣省台南縣善化鎮善化國民學校。

1. Pupils: Cheng Ya-hsin and sixteen classmates.
2. Directors (teacher): Lin Chung-ohiao, Hsu Yung-te

校長：鄭金宗

四、研究目的：我們常食豆芽等，為什麼都要用綠豆培植，其他豆類不可以嗎？於是由這個問題引起做「各種豆類發芽的研究。」

五、研究結果：

1. 綠豆發芽最快，約半天，皇帝豆發芽最慢約需兩天。
2. 大粒的豆不一定發芽快，小粒豆不一定發芽慢。
3. 下種後第一天的重量，增加最多約一倍，因為豆發芽時要吸收很多的水分。
4. 豆下種第四天，增長了約一倍長度，變化最大。各種豆下種後，到長出子葉收時間，是五天到六天。
5. 豆放在潮濕、溫暖、黑暗的在方，容易發芽。
6. 豆種浸在肥料水中，大都不會使豆發芽加快，反而會把豆弄死（肥料成分太多會妨礙發芽）。
7. 各種豆類中綠豆發芽最強，不管浸在那一種肥料水裏都會發芽，只有鹽水發不起來，所以豆芽菜大多用綠豆培植。
8. 豆臍向下的豆發芽比較快。舊的豆發芽很慢。
9. 同種的豆有大、小、輕、重之別，而發芽以大而重的豆發芽力強，小而輕的豆發芽力弱。
10. 在天然肥料中（尿水）可以加快豆的生長，而發出來的芽亦比較粗大。

3. School: The Shan Hwa Elementary School, Tainan.

Principal: Cheng Chin-chung

4. Propose:

We usually have bean-sprouts for food. They are developed from green beans. Can other kinds of beans be used to sprout and how they can be used to do it?

5. Results:

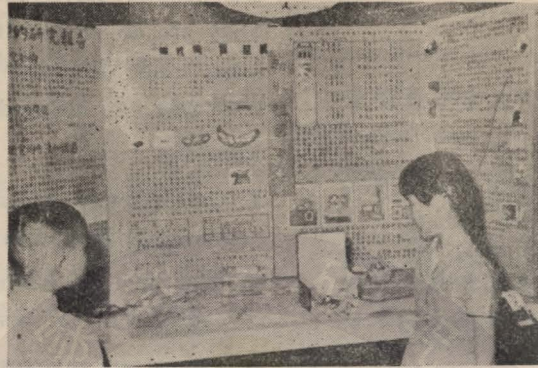
1. Green-beans begin to sprout after 12 hours. King-beans sprout after 2 days.
2. The size of beans has no relation with its sprouting speed.
3. Beans put in experimental boxes double their weight after one day, because they suck up more water.
4. Beans put in experimental boxes double their length after 4 days.
5. Beans in experimental boxes glow green leaves after 5 or 6 days.
6. A wet, warm and dark place is suitable for bean sprouting.
7. The fertilizer water cannot help beans sprouting faster, on the contrary beans die in the heavy fertilizer water.
8. Green-bean sprouts are cultivated very fast and easy in any kind of fertilizer except salt-water, therefore it is very popular to be served for food.
9. The downwards bean-navel sprouts faster. Old bean sprouts slowly.
10. The larger and heavier the bean, the stronger and longer its sprout is.

蟑螂的研究報告

A STUDY OF THE ROACH

國民學校初小組第四名

Fourth Award of the Lower Elementary Level



- 一、展品製作者：劉保羅等卅人。
- 二、指導教師：彭炳耀先生，楊聖哲先生。
- 三、學校：台灣省立新竹師範學校附屬小學。

校長：陳世慧

四、研究目的：

1. 瞭解蟑螂的生殖情形、習性及食物。
2. 蟑螂對人類有害應如何驅除。

五、研究結果：

1. 蟑螂的繁殖力極強，生存力亦強。
2. 蟑螂性喜成羣生活在黑暗處、裂縫及角隅等地方。
3. 蟑螂多係白日休息，夜間出來活動找尋食物。
4. 蟑螂食物的範圍很廣。
4. 蟑螂對人類的害處很大應速捕滅，其驅除方法，除捕捉外，藥物如樟腦、克蟑螂、B.H.C.等可慢性使其暈倒而死亡。

1. Pupils: Lin Pao-lo and thirty others.
2. Director (teacher): Peng Ping-yao and Yang Sheng-che
3. School: The Affiliated Elementary School of the Provincial Hsin-chu Normal School

Principal: Chen Shih-wei

4. Objectives:

- (1) To understand the life of roaches.
- (2) To study the harm that roaches do to people and how to get rid of them.

5. Results:

- (1) Roaches propagate very fast with strong ability for survival.
- (2) Roaches like to hide in the darkness.
- (3) Roaches conceal themselves in the daytime and search food at night.
- (4) Roaches can eat various kinds of food.
- (5) Roaches do harms to human beings.

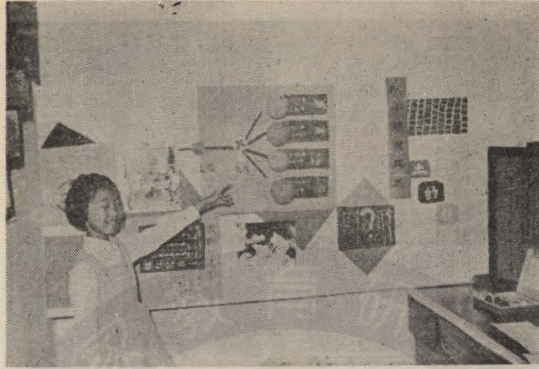
There are several insecticides to kill them.

- a. Camphor b. Quick-kill Black-beetle
c. Anti-black-beetle d. B H C.

泥土強度的研究
COHESION OF SOILS

國民學校初小組第五名

Fifth Award of the Lower Elementary Level



一、展品製作者：陳家隆等五人。

二、指導教師：林月完先生。

三、學校：台灣省台北縣板橋鎮實驗國校。

校長：連瑞金

四、研究目的：瞭解各種泥土的性質及強度。

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五、研究結果：

1. 紅土黏力好而強度最大又最不容易破

損。黏土次之，壤土、砂土再次之。

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2. 修補牆壁最好用紅土，其次用黏土因

為它的強度和紅土差不多。

1. Pupils: Chien Fei-li and her six classmates

2. Director (teacher): Lin Yueh-wan

3. School: The Pan-chiao Experimental Elementary School, Pan-chiao Hsian

Principal: Lien Shui-shin

4. Objectives:

To study the cohesion of four different kinds of soils.

5. Results:

(1) Red clay has the highest cohesion. Gray clay is the next, while sandy loam is the lowest.

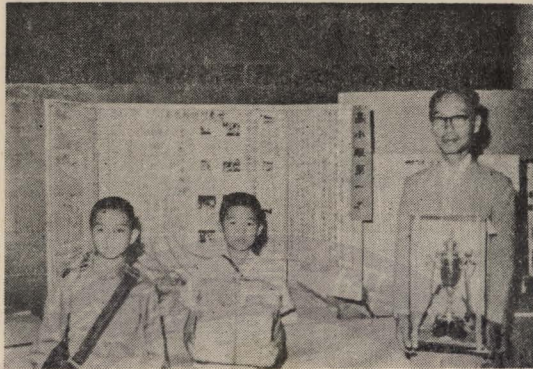
(2) Red clay is the best for repairing walls. Gray clay is the next.

竹東附近的化石

FOSSILS IN THE NEIGHBOURHOOD OF CHUTUNG CHEN, HSINCHU HSIEN

國民學校高小組第一名

First Award of the Upper Elementary Level



- 一、展品製作者：張上邕等十二人。
- 二、指導教師：李保松先生。
- 三、學校：台灣省新竹縣竹東鎮中山國民學校。
- 校長：鄭麟書
- 四、研究目的：

1. 學生偶然在學校附近，發現蛤類的化石一塊，由是對本鎮以前是不是「海」呢？地下有些什麼資源而發生疑問，於是學生們開始探求它。
2. 同時在本年四月間，「竹東石油公司」24號油井附近，發現一具比較完整的大動物化石（好像鯨魚骨骼化石），引起各方面的注意，於是學生們想用他們的手腦來揭開本鎮很久以前是什麼樣子的世界。

五、研究結果：

1. 在教師指導之下，學生們細心的觀察研究，將化石的形態和大小分類，對照岩石圖鑑判斷化石的動物種類和存在年代，推定為新生代（上新世），即約一千六百萬年前的遺物。
2. 研究化石，雖是屬於地質學上的一門

1. Pupils: Chang Shang-yung and twelve classmates
2. Director(teacher): Li Pao-sung.
3. School: The Chung Shan Elementary School, Chutung Chen, Hsin chu
4. Objectives:

- (1) A pupil found a fossil near by the school and wondered whether Chutung was under the sea millions of years ago. They also searched for valuable underground resources.
- (2) In April, 1961, a fossilized skeleton of a whale was discovered in the vicinity of the No.24 well of the Chutung Gas Company. From these samples pupils tried to discover what kind of world could Chutung have been in ancient times.

5. Results:

- (1) Under the direction of the teacher, pupils observed, studied and classified the fossils according to their form and magnitude in comparison with the Rock Chart.
It was concluded that these animal fossils belonged to the Tertiary Epoch of 16 million years ago.

艱深學問，但學生們對它有深刻的印象且能藉此揭發科學之謎的一部份，並激發今後繼續研究的志願。

(2) Although the study of fossils is a very difficult branch of geology, and is beyond our knowledge, we are deeply impressed by the study.

食 物 與 睡 眠

REQUIREMENT OF FOOD AND SLEEP FOR ANIMALS—EXPERIMENT ON MICE

國民學校高小組第二名

Second Award of the Upper Elementary Level



一、展品製作者：陳沅等二人。

二、指導教師：蘇游江先生。

三、學校：台灣省基隆市七堵國民學校。

校長：蘇春長

四、研究目的：

1. 食物與睡眠兩種對動物生命的繼續輕重比較。

2. 以雌雄兩種老鼠做實驗對象。

五、研究結果：

1. 不睡眠雄鼠體重逐天減輕較雌鼠快。至第二天精神漸差，至第三天毛呈倒豎，其色稍黃。

2. 不睡眠雄鼠至第四天漸不能活動，奄奄一息繼而死亡。雌鼠可活到五天。

3. 不吃食物雄鼠與雌鼠體重的減輕較不睡眠慢，前三天均照常活動，至第四天開始，走動時間較短，有時睡覺，至第五天開始毛逐漸變黃色，都在睡覺。

1. Pupils: Chen Yuan, Tsai Su-chun

2. Director (teacher): Su Yu-chiang

3. School: The Chi Tu Elementary School, Keelung.

Principal: Su Chun-chang

4. Objectives:

(1) Food or sleep which is more important to life.

(2) A Comparative study of two groups of mice.

5. Results:

Mice without sleep

(1) Loss of weight gradually, especially the male one.

General debility on the second day.

Cannot stand up with hair turned up and yellowish on the third day.

(2) Cannot not move. Nearly stop drawing breath and then died on the fourth day.

Female mice can live for five days without sleep

4. 不吃食物雄鼠至第八天不能活動，閉上眼睛，至第九天奄奄一息繼而死亡。雌鼠至第十天不能活動，閉上眼睛，至第十一天奄奄一息繼而死亡。
5. 不睡比不吃食物死得快。雄的比雌的生命短。

Mice without food

- (1) Loss of weight much slower than those suffering from lack of sleep.
- (2) Normal life during the first three days.
- (3) Walk slowly and were sleepy and dozy on the 4th day. With hair turned up and yellowish on the 5th day.
- (4) All went to sleep on the 8th day and died on the 9th day. Female mice can survive 10 or 11 days without food while male mice live a shorter life.

溫泉與銹斑的研究
EFFECT OF HOT SPRING ON RUST FORMATION

國民學校高小組第三名
Third Award of Upper Elementary Level



- 一、展品製作者：林伯淳等六人。
- 二、指導教師：潘以平先生。
- 三、學校：台灣省陽明山管理局中山國民學校。
校長：王芳蘭
- 四、研究目的：觀察實驗北投區家庭用金屬容易生烏銹斑的原因及如何防止。
- 五、研究結果：
 1. 鐵器放入真空瓶內三天或兩週均無變化。
 2. 鐵器放入油類瓶內三天無變化，兩週

1. Pupils: Lin Pe-chun and his five classmates
2. Director (teacher): Pang I-ping
3. School: The Chung Shan Elementary School, Yany-ming Shan Administration
Principal: Wang Fang-lan
4. Objectives:

Students observed that metal utensils in the families of the Pa-tou area rust easily. They like to know the reason why and how to prevent it.
5. Results:

極少變化。

3. 鐵器放入糖水內三天發現少數黑褐色斑點，兩週布滿黑褐色斑點。
4. 鐵器放入自來水內三天發現少數褐色紅銹斑點，兩週布滿褐色紅銹斑點。
5. 鐵器放入鹽水內三天發現少數深褐色紅銹斑，二週布滿深褐色紅銹斑。
6. 鐵器放入溫泉水內三天呈現烏黑少許銹斑，二週烏黑且濃的銹斑而布滿了。(此係受硫化作用故易生烏銹斑。)
7. 油類因能發生隔絕作用，若能常以油類擦拭，可防止生烏銹斑。

New Iron Nails in Different Kinds of Materials for an Experiment of Rust Formation

Materials for Test	Result (3 days)	Result(2 weeks)
Empty bottle	A few greenish brown rusty spot	Plenty of greenish brown spots
Vacuum bottle	Negative	Negative
Peanut oil	Negative	A little effect
Lubricating oil	Negative	A little effect
Sugar solution	A few dark brown spots	Plenty of dark and brown rusty spots
Tap water	A few dark and red rusty spots	Plenty of dark and red rusty spots
Saline solution	A few dark and black rusty spots	Plenty of dark and red rusty spots
water from hot spring	A few dark and black rusty spots	Plenty of dark, black and thick rusty spots

兒童對於色彩選擇的研究

A STUDY OF CHILDREN TO SELECT COLORS

國民學校高小組第四名

Fourth Award of the Upper Elementary Level



- 一、展品製作者：李彥欽等十六人。
- 二、指導教師：丁正杰先生。
- 三、學校：台灣省台北市龍安國民學校。
校長：梅翰生。
- 四、研究目的：瞭解兒童究竟喜歡什麼顏色。
- 五、研究結果：
 1. 發現兒童對於色彩的喜歡和討厭，不論男女有一種共同的趨向。
 2. 由此可知，兒童審美的觀念以及明辨是非喜惡的能力，有共同一致的趨勢。

1. Pupils: Lee Yen-chin and her sixteen classmates
2. Director (teacher) : Ting Chen-chueh.
3. School: The Lung-an Elementary School, Taipei
Principal: Mai Han-sheng
4. Objective:
What colors do children like ?
5. Result:
Children have common likes or dislikes about color.

太空的生存——氧氣的解決
OXYGEN SUPPLY FOR SPACE MAN

國民學校高小組第五名
Fifth Award of the Upper Elementary Level



一、展品製作者：林素香○

二、指導教師：莊正彥先生○

三、學校：台灣省宜蘭縣冬山鄉順安國民學校○

校長：朱錫堽

四、研究目的：為了太空中無氧氣，人與動物上太空時除非自帶氧氣，否則不能生存，如果利用植物的光合作用，人和動物上太空時帶些植物，不是便可以解決太空中缺乏氧氣的問題嗎？為了證明這種想法，因此便做了這次實驗○

五、研究結果：

1. 把青蛙分裝兩瓶內，以導管相通，結果因為青蛙得不到充分氧氣供其呼吸作用，六小時後，青蛙先後都死了○
2. 把青蛙和甘薯苗分裝兩瓶以導管相通，因為青蛙呼吸作用吐出的二氧化碳供甘薯苗的光合作用，而甘薯苗光合作用後放出氧氣正可供青蛙的呼吸作用，結果青蛙得到充份的氧氣而活着，甘薯苗亦得到充份的二氧化碳而不至於枯黃○
3. 由此可證明動物依靠植物生存，植物依靠動物而活○根據此一原理，利用

1. Pupil: Lin Si-huiang

2. Director (teacher) : Chung Cheng-yen

3. School: The Chun-an Elementary School,
Ilan Hsien

Principal: Chu Hsi-wang

4. Objective:

There is no air in space. Space man has to carry oxygen in his journey. If a space man brings some plants along, he can get the supply of oxygen through photosynthesis of the plants as verified by the experiment.

5. Experiment:

- (1) Two bottles connectd by glass tubes.
- (2) One frog in each bottle --- Died after six hours.
- (3) Plants in each bottle --- Withered after two days.
- (4) Frog in one bottle, plants in the other --- Both alive.
- (5) Mouse in one bottle, flowering plants in the other --- Both alive.

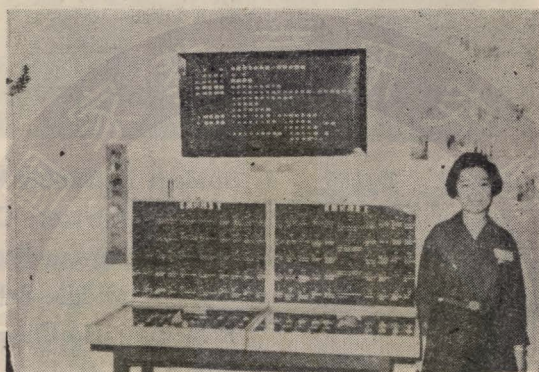
植物的光合作用，以供給太空人（或動物）的氧氣，而太空人（或動物）的排泄物，正可供植物生長，如此循環便就可以解決太空上氧氣的缺乏問題。

6. Result:

Space man may get oxygen supply from the plants.

貝類的採集 COLLECTION OF SHELLS

初級中等學校組第一名
First Award, Junior Middle School



一、展品製作者：初一忠班全體學生。

二、指導教師：謝秀明先生。

三、學校：台灣省立台北第一女子中學

校長：江學珠

四、研究目的：

1. 利用暑假在海邊游泳，順道採集貝類，以激發學生對於搜集工作及研究水產生物之興趣。

2. 練習分類及形態的觀察，以認識貝類的形態及分類。

3. 將採集研究結果，製成教具。

五、成果簡介：

1. 選出貝類標本百餘種，依分類排列，置於標本盒內。

2. 使學生認識分類的方法與貝類的形態。

3. 啟發了學生對研究水產生物的興趣。

4. 已製成教具，以供教學使用。

1. Student Entrants: Students of Junior 1-A

2. Teacher Advisor: Hsieh Hsiu-ming

3. School: Taiwan Provincial First Girls' Middle School

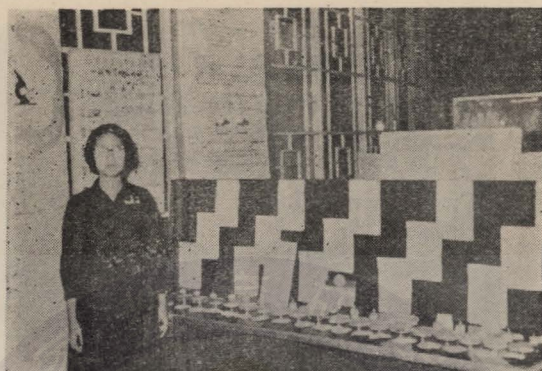
Principal: Chiang Hsueh-chu

4. Summary: 100 some kinds of shells were collected and displayed in mounting boxes.

一般物質結晶的研究
CRYSTALLIZATION OF INORGANIC SALTS

初級中等學校組第二名

Second Award, Junior Middle School



一、展品製作者：莫芷媛 藍采芸 黃詠涼
王婉美 邱淑媛

二、指導教師：張秀棗先生。

三、學校：台灣省立台中女子中學。

校長：何珍淑

四、研究目的：為了解一般物質的各種結晶。

五、成果簡介：

1. 由各種無機鹽類的飽和溶液所析出之晶體計分為六大晶系。
2. 同一物質晶體的大小往往隨晶體的緩速而有差異（例如硫酸銅），結晶遲緩，所成晶體較大；結晶迅速所成晶體較小。有些物質，如硫磺在結晶時却隨着結晶速率的不同而產生不同類型的晶體。
3. 不同礬類的結晶，所成晶形亦異（如鉀明礬，銨明礬等的晶形）。

1. Student Entrants: Mo Tze-ai and others

2. Teacher Advisor: Chang Hsiu-tsau

3. School: Taiwan Provincial Taichung Girls' Middle School

Principal: Ho Chen-su

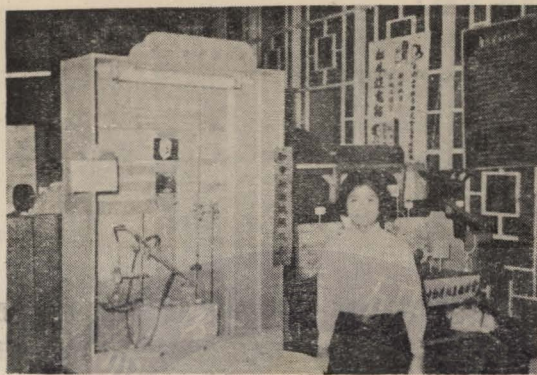
4. Summary:

- (1) A total of 6 crystalline systems was found among the crystals that form in super-saturated solutions of inorganic salts.
- (2) The size of crystals of a substance, such as hydrated CuSO_4 usually depends upon the rate of crystallization. The slower is the rate of crystallization, the larger will the crystals grow. Some substances, such as sulfur, will vary in shape at different rate of crystallization.
- (3) The crystals of potassium alum and ammonium alum are different.

電磁無漿攪拌力之研究
THE EFFICIENCY OF ELECTROMAGNETIC STIRRER

初級中等學校組第三名

Third Award, Junior Middle School



- 一、展品製作者：彭瑞媛 廖錦嬌
- 二、指導教師：黃文貴
- 三、學校：新竹縣立新竹第二女子初級中學
校長：武純仁
- 四、研究目的：鑒於目前核子之爆炸，輻射塵之分佈以及放射能之作用，其放射線可由其速度、穿透力以及電場、磁場所生之效應而不同。因而引起研究電磁力在科學上之效用及對人類生活之影響的動機，乃首先着手研究電磁在攪拌上之作用，以便吾人在分析化學及日常生活上之利用。
- 五、成果簡介：

(一)結論及發現：

1. 容器底部較大者易攪拌。
2. 容器重心較低時穩度較大。
3. 液體濃度與攪拌速度成反比。
4. 磁場與攪拌轉子之位置在正規時始能發揮最大效應。
5. 速度之改變以電阻控制時較為穩定。
6. 速度之改變以磨擦控制時，其攪拌常是不均狀態。
7. 磁場之測定與溶液濃度有關，

1. Student entrants: Peng Shiu-yuen and Liao Chin-chiao
2. Teacher advisor: Huang Wen-kuei
3. School: The Second Girls' Middle School of Hsin-chu
Principal: Wu Shih-jen
4. Summary:

- (1) The concentration of liquid is in reverse proportion to the speed of stirring.
- (2) The greatest efficiency will be achieved when the container is properly placed in the center of magnetic field and when the diameter of the container is 2-3 times longer than the length of stirring bar.
- (3) The speed of the stirring can be well adjusted by change of resistance.

8. 容器底部大於轉子之二倍以上至三倍時效應最大。

9. 原來不能攪拌之密閉器，經此實驗亦能攪拌。

(二) 實驗成果對人類生活之貢獻：

1. 化學分析，農藝化學，生物實驗，製藥乳劑配置時之密閉攪拌必須運用本實驗器。

2. 日常生活，家庭調和牛奶，咖啡，味料調和等，可在密閉中攪拌以保衛生。

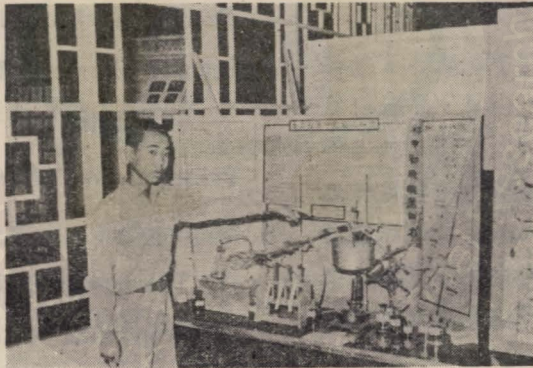
蕃石榴葉中鞣酸之研究

TANNIC ACID IN THE LEAF OF GUAVE

(Psidium guayava)

初級中等學校組第四名

Fourth Award, Junior Middle School



一、展品製作者：林子正

二、指導教師：林玉輝

三、學校：屏東縣立內埔中學

校長：李為

四、研究目的：蕃石榴在台省產量極多，其果實雖供食用，惟其葉尚未被利用，可否由其葉製取鞣酸以供應用為本研究之主要目標。

五、成果簡介：可自蕃石榴葉中提取鞣酸，其粗製品為黑褐色塊狀，有光輝，吸水性極強。取其少量置試管中，加入少量的水極易溶解，再加入氯化鐵溶液幾滴，即成黑色沉澱。

1. Student Entrant: Lin Tze-Chen

2. Teacher advisor: Lin Yu-huei

3. School: Ping Tung County Nei Pu Middle School.

4. Summary:

The raw tannic acid of guava is a shining dark brown substance in solid state. It easily dissolves in water. When several drops of $FeCl_3$ solution are added into its aqueous solution, black precipitates will be formed.

木耳生活史之研究
LIFE HISTORY OF AURICULARIA AURICULARIA-JUDAE

初級中等學校組第五名
Fifth Award, Junior Middle School



一、展品製作者：陳靜文、董瑜君、雷貴蘭

二、指導教師：吳金塗先生

三、學校：基隆市立第二初級中學

校長：吳金塗

四、研究目的：因上山採集香蕈不獲而採到木耳，但在參考書及圖鑑裏都找不到木耳的生態及生活史，乃從事觀察與研究。

五、成果簡介：木耳的生活史根據其性質，形態及發育程度分為下列三期：

1. 單套染色體期：

含單套染色的擔孢子萌發為細胞含單一細胞核的菌絲。

2. 雙細胞核期。

菌絲每一細胞中的單核裂為雙核，然後菌絲發育為擔子體。

3. 雙套染色體期。

擔子體的子實層下產生擔子夾，擔子夾上在產生擔孢子前每一個胞中二核結合為一，染色體成為雙套，經減數分裂而產生擔孢子。

1. Student Entrants: Chen Chin-wen and others

2. Teacher Advisor: Wu Chin-tu.

3. School: Keelung Municipal second Junior Middle School

Principal: Wu Chin-tu

4. Summary:

(1) Haplophase: The haploid basidiospores of *Auricularia* germinate into uninucleate hyphae

(2) Dikaryophase: The hyphae dikaryatize and grow into fruiting bodies, known as basidiocarps.

(3) Diplophase:

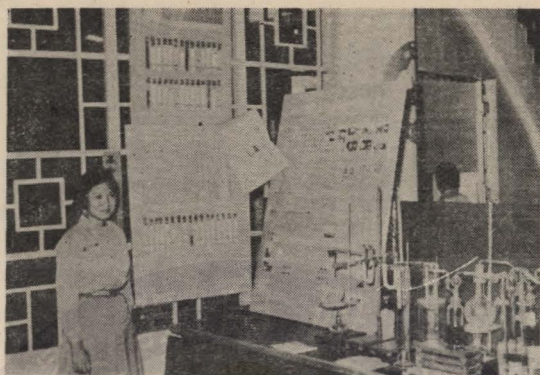
Beneath the hymenium of basidiocarps are young binucleate basidia, which undergo karyogamy and meiosis before the formation of basidio-spores.

研究溶質溶於溶劑時的體積變化

VOLUME CHANGE IN FORMATION OF SOLUTIONS.

高級中等學校組第一名

First Award, Senior Middle School



一、展品製作者：方阿雪 徐鐵宜 朱美珠

二、指導教師：曾金來先生

三、學校：省立新竹師範學校

校長：王宏志

四、研究目的：研究溶質溶於溶劑時體積變化的詳細情形。

五、成果簡介：摘要列舉數項如下：

受試物質計氣體八種，固體二十種，皆用作溶質、水用為溶劑，液體二十六種，其中有些液體使互相作為溶質及溶劑，以實驗及計算方法，求得一克分子量的各種溶質溶於溶劑一立升時，其體積所增加的cc數。

1. Student Entrant: Fong Ah-hsieh and others

2. Teacher Advisor: Tsen Chin-lai

3. School: Provincial Hsin Chu Normal School

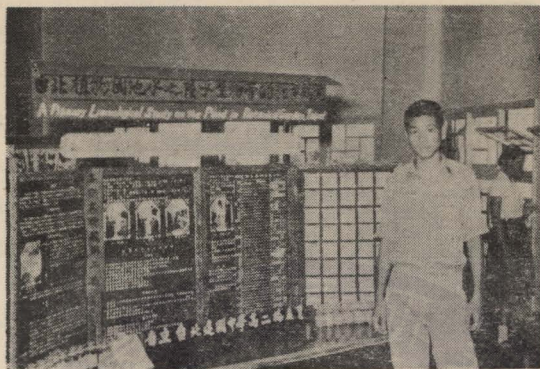
Principal: Wang Hung-tze

4. summary:

The tested substances included 8 gases, 20 solids and 26 liquids. Gases and solids were used as solutes and water, as their solvent. Among the liquids, some were selected to be either solutes or solvents for alternation. By experimentation and calculation, the results indicating volume change (c.c.) from 1 mol of solute dissolving in 1 liter of solvent were determined.

臺北植物園內池中浮游生物的調查
POND PLANKTON IN BOTANICAL GARDEN, TAIPEI

高級中等學校組第二名
Second Award, Senior Middle School



一、展品製作者：楊英育

二、指導教師：楊義賢

三、學校：省立台北建國中學

校長：賀翊新

四、研究目的：為了解池中生物之種類及其消長，以利將來採集及參考。

五、成果簡介：

(一)本池的浮游生物種類不多依採集所標本鑑定出來的有40種，其中以浮游植物的數量較多，計有綠藻類五屬八種，接合藻類二屬三種，矽藻類七屬十種，鞭毛藻種二屬三種，藍藻類三屬三種。

浮游動物方面計有角枝類一屬一種，橈腳類二屬二種，輪蟲類七屬七種，原生動物三屬三種。

(二)春季出現的種類以綠藻類最多。夏季出現的種類以鞭毛藻類最多。

1. Student Entrant: Yuang Yin-yu

2. Teacher Advisor: Yan Yi-hsien

3. School: Provincial Chien Kuo Middle School
Principal: Ho Yi-hsin

4. Summary:

40 kinds of organisms were collected and identified. Majority of them were phytoplankton which consist of 8 species of green algae in 5 genera, 3 species of conjugating algae in 2 genera, 10 species of diatoms in 7 genera, 3 species of flagellates in 3 genera.

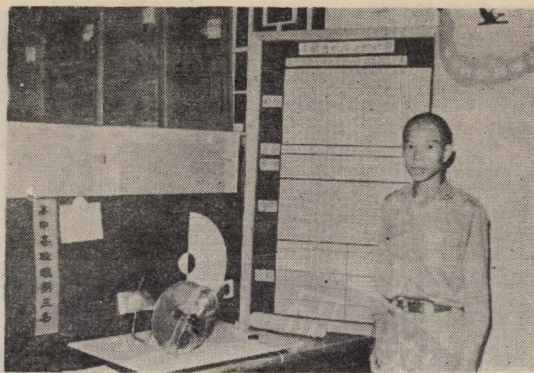
Among zooplankton were 1 species of water flea in 1 genus, 2 species of copepods in 2 genera, 7 species of rotifers in 7 genera and 3 species of protozoans in 3 genera.

The dominant microbes in this pond are green algae in spring and flagellates in summer.

牛頓色板改進的研究 IMPROVEMENT OF NEWTON'S DISK

高級中等學校組第三名

Third Award, Senior Middle School



一、展品製作者：楊孟宗

二、指導教師：沈士傑

三、學校：基隆市立第一中學

校長：姚廣濱

四、研究目的：教科書上說「互補色可利用牛頓色板旋轉相加呈白色」但實驗室因色板日久保管不佳而褪色結果呈黃色為求證書上的學理，乃試用顏料調配，但屢經試驗均不如理想，因此引起改良的意念。

五、成果簡介：

(一)應用：試驗成功後乃將原用的紅燈改為可生成八種顏色的燈光並使前面的白紙用兩個六色的紙輪照明而變成有色因此可作下列各種實驗。

1. 可直接求得 8 對互補色之實驗

$$8 \times 1 = 8$$

2. 可作單色與單色配合的研究 80 種

$$2 \times 5 \times 8 = 80$$

3. 可作單色與複色配合的研究 200 種

$$5^2 \times 8 = 200$$

(二)改良後的優點：

1. Student Entrant: Yang Mun-chung

2. Teacher Advisor: Shen Shih-chieh

3. School: Keilung Municipal First Middle School

4. Summary:

The improved Newton's disk is a simple apparatus, easily made with low cost materials. Electric lamps and colored cellophane paper are used for serving a assorted lights which may cover the distortion by natural light. In using their disk, hundreds of color-combining experiments can be successfully conducted in quick and easy ways.

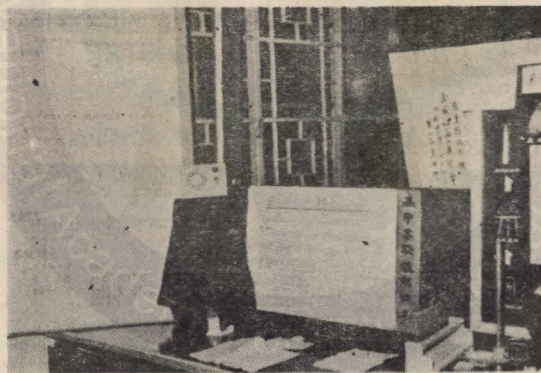
牛頓色板	改良後的牛頓色板
1. 須要精細的調色與配合。	1. 用任何顏色紙即可。
2. 色板價貴。	2. 所用色紙價廉。
3. 色板易褪色保管困難。	3. 毫無困難。
4. 每一色板僅作一色的實驗。	4. 可作數百種實驗。
5. 更換色板須時45秒。	5. 僅須 $\frac{1}{2}$ 秒即可更換。
6. 色板會受附近光色的影響。	6. 全部用電顏色永久一致。

電子節拍器實驗報告

ELECTRONIC METRONOME

高級中等學校組第四名

Fourth Award, Senior Middle School



一、展品製作者：徐明德

二、指導教師：楊明家先生

三、學校：台北市私立大同工業職業學校
校長：林挺生

四、研究目的：節拍器這樣東西，在上音樂課時不難見到它，通常是一個單擺和一些機械裝置組合而成。這些機械時常發生故障，乃設計用這種毫無「機械裝置」的電子節拍器來代替它。電子節拍器一則不易發生故障，二則它用起來有它獨特的好處，即聲光俱備；三則也把我們

1. Student Entrant: Hsu Ming-te

2. Teacher Advisor: Yang Ming-chia

3. School: Taipei Ta Tung Industrial Vocational School

Principal: Lin Ting-sen

4. Summary:

The electronic metronome is a self-de-

所學到的電工原理作有力的應證。

五、成果簡介：

(一)裝置結果：試裝結果由於市面零件所限，無法購得伏特數較大之可變電阻。因此節拍的範圍不如想像的完善。此後如再增加幾個RC變化裝置，可使本機之節拍範圍更廣，若再加設一級電壓放大級，聲響可更加宏亮。

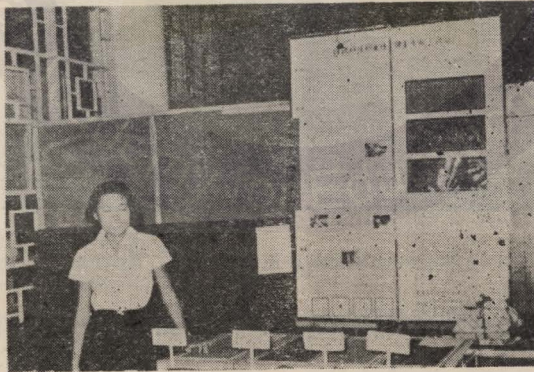
(二)本機特色：

1. 無機械裝置，不易壞。
2. 聲光俱備，可只看閃光或閃光響聲並俱。
3. 電路簡單奇妙。
 - (1) A 電用電容阻抗降法獲得。
 - (2) 氬氣放電管與RC構成控時電路。
 - (3) 單管的電力放大。

signed device which excels the classical metronome in durability and effectiveness. RC circuit, Neon discharging tube, a sound system, and frequency control system constitute main parts of the device. Synchronized light and sound signals will appear in its operation.

雄鷄移植卵巢性腺素支配之研究
EFFECT OF SEX HORMONE ON THE SECONDARY SEX CHARACTER OF A ROOSTER

高級中等學校組第五名
Fifth Award, Senior Middle School



一、展品製作者：劉金菊 徐芳史 張麗麗
李惠勇 劉初枝 楊素妮

二、指導教師：楊樹華先生

三、學校：省立新竹女子中學

校長：孟淑範

四、研究目的：雌雄動物之第二性徵，顯受性腺素之支配，雄性動物之精巢 (Tes-

1. Student Entrants: Liu Chin-chiu and others

2. Teacher Advisor: Yang Hsu-hua

3. School: Taiwan Provincial Hsinchu Girls' Middle School

Principal: Meng Shu-fa

4. Summary: 3 cockerels were treated as

tis) 中分泌之雄性素 (Male Sex hormone) 可促進該雄性之第二性徵，例如家禽之雞冠，啼鳴及羽毛之光彩等；雌性動物之卵巢 (Ovary) 中，亦可產生雌性素 (Female Sex hormone)，促進雌性動物之第二性徵。將此二種生殖器官割除，則其性腺素分泌停止，雌雄第二性徵皆不顯著，但若將雄雞之精巢與雌雞之卵巢交換移植，所產生之激素 (Hormone) 必互予控制，乃使對方之生理機能完全改變。本實驗小組學生欲明瞭其性腺素究能影響至如何程度，乃選定雞為實驗之材料，在其性腺尚未成熟之時，將雙方之生殖系統予以手術上之互換，觀察生理機能之變化。

五、成果簡介：

以三個雄性幼雛為實驗組，一雄性幼雛供對照之用。第一號雄雛受卵巢的移植，結果外觀與舉止完全與雌雞相同。第二號雄雛，閹去睪丸，結果雞冠稍發育，羽毛豐滿，性情柔和，第三號雄雛，注射雌性激素，結果雞冠仍甚發育，羽毛較粗硬，性情較柔和。第四號雄雛作對照用，雞冠發育羽毛粗硬，性兇猛。

四、結 語

此次科學展覽會在我國已是第二屆，各級學校師生均已有了此經驗，準備展品的時間，也比較充裕，因此展出成績，更為良好。充分發揮了青年學生的創作能力，一般觀眾均獲得深刻印象，外國籍科學專家亦稱讚不已。此項成果，實由於美國亞洲協會在經費及精神雙方面的贊助與鼓勵，及教育部的全力輔導，加以台灣省教育廳及國立台灣科學館工作同仁的日夜辛勞，有以致之。復承各級學校同仁認真推動及各界人士的贊助，始克順利完成，併此誌謝。

experimental group. 1 cockerel was untreated as control.

No. 1 rooster, after transplantation of ovaries, showed the characteristics appearance and behavior of a hen.

No. 2 rooster, after removal of testicles, showed a less developed comb, thick feathers and mild temper.

No. 3 rooster which was injected with 5 c.c. of female sex hormone showed a rather developed comb, rather stiff feathers, and behaved mildly.

No. 4 rooster was untreated as control.

4. ACKNOWLEDGMENT

From the experience gained in the First Students Science Exhibition, schools, teachers and students have looked forward with great interest to participating in the contests with their exhibits for the Second Science Exhibition. Visitors, experts and advisers on science education from AID and the Asia Foundation were very much pleased at the creative thinking and ability of our students as expressed in the Exhibition. The Exhibition Council would like to take this opportunity to express its grateful thanks for the aid and assistance rendered by the Asia Foundation and the guidance of the Ministry of Education. We wish withal to express our gratitude to the staff from the Department of Education of the Provincial Government and the National Science Hall for their work day and night in the preparation period. We are greatly indebted to all agencies concerned and the school principals, teachers and students for their contribution and cooperation to the overall success of the Second Students Exhibition.

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國立教育