# PROCEEDINGS HAWAIIAN ACADEMY OF SCIENCE

NINTH ANNUAL MEETING
MAY 3-5, 1934

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# HAWAIIAN ACADEMY OF SCIENCE

The Hawaiian Academy of Science was organized July 23, 1925, for "the promotion of research and the diffusion of knowledge."

The sessions of the Ninth Annual Meeting were held in Dean Hall, University of Hawaii, May 3 and 4, 1934, ending with a banquet at the Pacific Club, May 5.

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# PROGRAM OF THE NINTH ANNUAL MEETING

## THURSDAY, MAY 3, 7:30 P. M.

Preliminary announcements.
Election of members.
Appointment of committees.
Presentation of papers:
Dr. Thomas C. McVeagh: Laboratory examination of criminal evidence.
Dr. Andrew W. Lind: Some refinements of vital indices in Hawaii.
Dr. John W. Coulter and Mr. Chee Kwon Chun: Social life and institutions on a rice plantation in Hawaii. (Presented by Mr. Chun.)
Dr. Elizabeth D. W. Brown: The preparation of breadfruit *po'poi* in the Marquesas, and its relation to Polynesian migrations.
Mrs. Ethel K. Allen: The microbiological aspects of the fermentation of Marquesan breadfruit *po'poi*.
Mr. Austin E. Jones: Earthquakes of Hawaii.
Dr. Royal N. Chapman: An experimental study of fluctuations of animal populations.

## FRIDAY, MAY 4, 7:30 P.M.

Dr. J. L. Collins: Pineapple taxonomy viewed in the light of the genetics of the pineapple.
Dr. C. P. Sideris, Miss B. H. Krauss and Mr. H. Y. Young: The formation and movement of the carbohydrate and organic nitrogen products in the various organs and tissues of the pineapple plant. (Presented by Dr. Sideris.)
Dr. Leonora N. Bilger and Mr. J. N. S. Williams: Cellulose from bagasse. (Presented by Mr. Williams.)
Dr. Earl M. Bilger and Mr. Robert Thompson: Copper content of Hawaiian foods. (Presented by Dr. Bilger.)
Dr. Nils P. Larsen and Miss Olga Fulton: Some serological observations. (Presented by Dr. Larsen.)
Mr. Ray J. Baker: Biological records with motion pictures.

## SATURDAY, MAY 5, 6:45 P.M.

Pacific Club banquet.
Constitutional order of business.
Installation of new officers.
Presidential address: Builders of the sea.
Adjournment.

# ABSTRACTS OF PAPERS

## BUILDERS OF THE SEA

(Presidential Address)

By

CHARLES H. EDMONDSON

Fringing reefs have their origin about the shores of islands or continents, building seaward on foundations of their own making or on submerged shelves previously formed. They grow outward as a flat platform, the outer rim of which is often slightly higher than the intervening area, which is always covered by comparatively shallow water. Barrier reefs extend for a considerable distance from shore, the intervening water or lagoon having a depth of from 10 to 50 fathoms. Atolls consist of narrow and usually interrupted rims of land surrounding a lagoon ranging in depth down to about 50 fathoms. The principal reef structures are found in the western section of the Atlantic Ocean, in the central and western areas of the Pacific Ocean, in the East Indian region and widely distributed throughout the Indian Ocean and the Red Sea, their limitations being in general between 30 degrees north and south latitudes.

While corals are widely distributed throughout the seas, ranging from the shore to great depths, reef-building forms are confined to an equatorial belt extending around the world and limited to depths of about 50 fathoms. They belong for the most part to the group Madreporaria which developed during the Mesozoic Era, but few present-day species are found as fossils earlier than the middle Tertiary.

An increase in the number of coral colonies is effected by free-swimming planulae produced within mature polyps. The planulae become attached, usually within 30 days if suitable conditions prevail and proper foundations are found. A basal plate of limestone is then laid down and a calyx or cup of limestone is built up in which the polyp rests. By budding, if it is a compound form, new polyps are added to the colony and the volume of the skeleton is increased. The coral animals always maintain a position at the surface of the colony. Polyps one fourth of an inch high may lay down deposits of limestone of indefinite thickness.

In Hawaii massive types of corals like *Porites* add from 5 to 8 mm of limestone to the surface annually and eventually may build up huge masses. Branching forms like *Pocillopora* may add nearly 2 inches to their fronds annually, but have a life span of but 15 to 20 years, during which time colonies 15 to 20 inches in diameter are produced.

Unicellular algae (Zooxanthellae) are lodged within the tissues of most reef-forming corals. The plant cells give color to the corals and mutual benefit results in this relationship by way of exchange of oxygen and carbon dioxide. Nearly all shoal water corals are hosts of filamentous green algae which bore into the skeleton, dissolving the carbonate of lime and thereby weakening the entire mass.

Among other important reef builders are hydroid corals, foraminifera and nullipores. The nullipores are marine plants secreting calcitic skeletons. They form branching clumps or are encrusting and assist in binding coral colonies together and filling crevices. On many reefs like those of Johnston Island nullipores predominate over corals; on other reefs like those of Wake Island they play a minor role. A semicalcareous alga, *Halimeda,* is of considerable importance as a reef builder. Carbonate of lime may also be precipitated in sea water by various physical and chemical conditions. Decomposition of the soft parts of organisms may result in the precipitation of carbonate of lime by the reaction of ammonium carbonate with calcium salts.

As the organic builders are responsible only for the superficial structures, the foundation of a reef is an important consideration. The subsidence theory of the origin of reefs as presented by Darwin in 1842 was strongly supported by Dana, Jukes, and other contemporary naturalists as well as by numerous investigators of more recent date. Alexander Agassiz, Admiral Wharton, and others were convinced that barrier reefs and atolls were formed not as a result of crustal sinking but by the planing down of islands and land areas into undersea platforms which became foundations for growing reefs, or by ash islands built up by volcanic action and subsequently cut down to subsurface levels as suitable supports for reef-forming organisms. The history of Falcon Island and the recent eruption of Krakatoa point to pyroclastic action as a probable source of islands in the southwest Pacific and the East Indies. Many atolls may have been formed in this manner.

The glacial control theory of reef formation has been favored by many investigators during recent years. According to this theory, during the glacial ages the polar ice caps received water from the ocean, thereby lowering the sea level 180 to 300 feet. Land areas yielding to the action of the waves and erosion were greatly reduced and platforms were cut about islands resting on a static foundation. As the ice floes melted, the level as well as the temperature of the sea rose and reef-forming organisms began to develop on the platforms at depths of from 30 to 50 fathoms. Existing reefs are assumed to be post-glacial in age.

Recently the late W. M. Davis presented a masterful defense of the general principle of subsidence in his book, "The Coral Reef Problem" (1928). This view assumes that reefs are formed during sinking of land

masses and that deep embayments of shores and drowned valleys result from the slow subsidence of crustal foundations. The small atoll which rests on a peak instead of a platform is also cited as evidence of a subsiding condition. Almost-atolls, in which numerous islands remain above the surface of a lagoon, represent, in the viewpoint of some observers, the remnants of a subsiding land mass.

Different interpretations of natural phenomena are not to be looked upon with disfavor but welcomed, for they are certain to clear up doubtful points and lead toward the truth. Frequently proponents of generalized theories are partly in the right and partly in the wrong; so in all probability will be found the conflicting views regarding the development of coral reefs. (Illustrated by lantern slides showing polyps, corals, and types of reef in various parts of the world.)

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## THE LABORATORY EXAMINATION OF CRIMINAL EVIDENCE

By

THOMAS C. MCVEAGH

Laboratory examination of criminal evidence is based upon the axiom: "For every result a cause." Given a complete picture of the physical results constituting a situation, whether criminal or not, it should be possible, theoretically, to reconstruct the preceding chain of events, by application of the recognized processes of deductive logic.

In the attempt to secure this complete picture of physical results, we examine such elements in the situation as are capable of acting upon our physical senses. We weigh, measure, smell, taste, feel, and compare. When we have done our best, the picture we have secured is the raw material upon which the detective's deductive faculties are to be exercised.

The examination of physical evidence for this purpose by the unaided physical senses dates dack to the misty past. The modern laboratory assists only by reënforcing our physical senses. As every piece of scientific apparatus has just this for its purpose, it becomes evident that the range of laboratory apparatus applicable to the examination of criminal evidence is practically coextensive with the range of apparatus available in all the sciences.

A classification of the work of a criminological laboratory was attempted, upon the basis of the material examined, as follows:

1. Original relics: material actually found upon the scene or related thereto, as dusts, fibers, hairs, blood, weapons, etc.
2. Derivative relics: traces left by deformation, such as fracture edges, scratches, impressions, and imprints. This division includes such extensive fields as criminal ballistics and document examination.

Lack of time prevented any exposition of actual methods of examination, but a few illustrations of methods of approach were given. Some probably fruitful research projects were also pointed out. (Illustrated with demonstrational material.)

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## SOME REFINEMENTS OF VITAL INDICES IN HAWAII

By

ANDREW W. LIND

Striking abnormalities in the age and sex structures of Hawaii's immigrant groups make comparisons of their fertility and viability on the basis of crude birth and death rates a somewhat questionable procedure. The low death rate of 8.5 per 1,000 in a racial group, of whom 44 per cent are in the healthy years from 20 to 30, may conceal a serious health problem. A relatively high crude death rate of 14.0 per 1,000 may merely indicate a population of old men ready to shuffle off.

Fertility rates of the several racial groups in Hawaii are altered markedly when correction is made for age and sex. From a position near the bottom of the list of crude birth rates, the Filipinos shift to first place when rates are figured on the basis of the women of childbearing age. Further refinements according to the age of the mothers give the following corrected rates of births per 1,000 women, 15 to 44 years of age, for the year ending June 30, 1932: Hawaiian and part-Hawaiian, 206; Portuguese, 156; Puerto Rican, 255; other Causasian, 79; Chinese, 150; Japanese, 188; Korean, 180; Filipino, 289. The Oriental and European immigrant groups are still in the stage of active biological expansion and their rates may be expected to decline as maturation and stabilization proceed.

Death rates in Hawaii in 1931, corrected for the age structure of the population, are as follows: Hawaiian and part-Hawaiian, 21; Portuguese, 11; Puerto Rican, 15; other Caucasian, 9; Chinese, 10; Japanese, 9; Korean, 12; Filipino, 13. The three groups with the highest corrected birth rates show likewise the greatest corrected death rates. Death rates, at least of the other Caucasians, Filipinos, and Chinese, are artificially lowered due to the emigration from the islands of those about to die.

A further analysis of death rates suggests the possibility of using the specific causes of death as indices of the state of biological equilibrium achieved by each of the immigrant groups. The diabetes rate, for example, appears to be positively correlated and pneumonia negatively correlated with the progress made along the way towards economic and social stabilization. (Illustrated with charts.)

## SOCIAL LIFE AND INSTITUTIONS ON A RICE PLANTATION IN HAWAII

By

JOHN WESLEY COULTER AND CHEE KWON CHUN

This paper is part of a chapter from a study of rice farming in Hawaii as it was carried on by immigrant Chinese in the heyday of the industry. The account is taken from kamaaina Chinese rice planters, very few of whom can speak English. Social institutions on rice plantations were in part carried over to the islands from China, and in part an adjustment to the new environment. As a result of the intermingling of rice farmers and natives, many Chinese learned to speak Hawaiian and used the language in social intercourse as well as in business dealings. Acquaintance between the two peoples led to interracial marriages which have markedly affected the population of the islands. New Year's was a time of unusual gaiety and hilariousness on a rice plantation. Its observances lasted three days, were accompanied by feasting and fireworks, the exchange of social calls between friends and relatives and working men and bosses. Hawaiians also entered into the spirit of the occasion and, arriving at Chinese homes early on the first day of the celebrations, were the recipients of favors from the Chinese.

Social and benevolent institutions played an important role in rice-farming communities. They took care of the aged and infirm and sent some of them back to China. A few societies, orginally formed as part of a concerted movement to overthrow the old Chinese monarchial system, became in Hawaii more significant for their social functions. The village store in a Chinese community was a social center as well as a place for business. Rice farmers gathered there during leisure hours, conversed agreeably, swapped news from near and far, smoked, and played cards.

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## THE PREPARATION OF BREADFRUIT PO'POI IN THE MARQUESAS, AND ITS RELATION TO POLYNESIAN MIGRATIONS

By

ELIZABETH D. W. BROWN

The purpose of this study is to present an accurate account of the making of breadfruit *po'poi,* stressing the relationships which throw light upon the leading biological conditions contributing to the success of the long transoceanic migrations of the Polynesians.

Breadfruit *po'poi* was the staff of life of the ancient Marquesan. At the time of discovery, the Marquesas supported a density of population comparable with that of the most densely populated countries, suggesting that the Marquesan diet was as efficient for living under insular conditions as that of other races for living under mainland conditions. This seems due in no small degree to the discovery of how to prepare breadfruit *po'poi* and related fermented foods which sustained the dense population in times of plenty and during long unforeseen periods of famine. Early accounts, supported by later scientific investigations, show that, on a leading diet of breadfruit *po'poi,* the Marquesan attained a remarkable physical and intellectual development.

*Po'poi* is composed of cooked *ma* (fermented breadfruit) and freshly roasted breadfruit in the proportion of half and half, if fresh *ma* is used, or one third *ma* to two thirds freshly roasted breadfruit if old *ma* is used. Its preparation compares in complexity with that of bread and many other modern foods. The evolution of the process must have required prolonged thought and experimentation extending far back into the unwritten history of the Polynesian race.

It seems unlikely that the Polynesians would ever have reached the mid-Pacific islands without their fermented foods, because efficient foods which could be kept without deterioration must have been indispensable on the long outrigger canoe voyages. On this assumption, fermented foods of the Polynesians must be classed among the requisites leading to the discovery and successful colonization of the islands of Polynesia.

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## THE MICROBIOLOGICAL ASPECTS OF THE FERMENTATION OF MARQUESAN PO'POI

By

ETHEL K. ALLEN

*Ma* is the preserved breadfruit commonly used as a starter for the promotion of fermentation in Marquesan *po'poi.* The samples of *ma* used in this study were part of a collection obtained in 1922 by Dr. E. D. W. Brown. The present investigations were concerned with a two-fold objective: the isolation and classification of the microorganisms responsible for the fermentation, and the ascertaining of similarities or differences in the microflora in comparison to that of Hawaiian taro *poi.*

Only rod-shaped bacteria were demonstrated in the stained smears of *ma* samples examined prior to the cultural studies. Cultural studies also failed to show the presence of yeast, mycoderms, or similar microorganisms. The

numbers and kinds of bacteria were best demonstrated by plating samples of the *ma* on a triple sugar nutrient agar. Colonies were visible on this medium after 3 days incubation at 35 degrees centigrade. Satisfactory isolations of the colonies were obtained in triple sugar nutrient broth after 48 hours' incubation at 35 degrees centigrade. Forty pure cultures were isolated in the course of the study.

All bacteria isolated and studied were, on the basis of morphological and cultural tests, species of the genus *Lactobacillus*. Classification of the isolated organisms was based upon their reactions in various media with special emphasis upon their ability to ferment 14 different carbohydrates in a nutrient broth base. The extent of the hydrogen-ion change in the carbohydrate media was determined electrometrically.

At the present time two species, *Lactobacillus delbrücki* (Leichmann) Holland and *L. leichmanni* (Henneberg) Bergey and others, and numerous varietal strains of each have been definitely classified. Recently completed tests indicate the presence of *L. pastorianus* (van Laer) Bergey and others and several closely related forms. Results to date indicate marked similarity between the fermentation of Hawaiian taro *poi* and Marquesan breadfruit *po'poi* with respect to microorganisms concerned as well as by-products formed. (Illustrated with charts and slides.)

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## EARTHQUAKES OF HAWAII

By

AUSTIN E. JONES

It has been possible to locate about 40 per cent of the earthquakes recorded at the Hawaiian Volcano Observatory in 1933. Of these 14 per cent have been located on the undersea slopes of the island.

Of the epicenters, two thirds have been located on the active volcanoes of Kilauea and Mauna Loa, and one third on the volcanic mountains Hualalai, Mauna Kea, and Kohala.

A considerable number of the epicenters have been located on the known rifts of the island and a slight concentration has occurred near the volcanic centers and craters.

Many epicenters have fallen in apparent lines away from known rifts. No topographic features have been found that indicate faults in these places, which radiate north, northeast by north, northeast, southeast by east, southeast by south, and southwest from the Mauna Loa summit crater.

The eruption of December 2, 1933, started with 12 recorded shocks. Six were well located, the first being slightly deeper than the following shocks, which were near or above sea level.

The numbers of earthquakes that have occurred each week form the basis of another sort of study. This seismicity became large for earthquakes of Mauna Loa distance, six weeks prior to the 1933 eruption. The same increase was noted two months prior to the Mauna Loa summit eruption of 1914. (Illustrated with maps.)

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## PINEAPPLE TAXONOMY VIEWED IN THE LIGHT OF THE GENETICS OF THE PINEAPPLE

By

J. L. Collins

Botanists who have worked upon the classification of pineapples are not in agreement in regard to the number of species. Some have considered all to constitute a single polymorphic species. Others divide them into six or more species.

Classification is further complicated by the asexual mode of reproduction common to many of the forms.

In a number of obscure taxonomic relations in other genera, genetic studies with species hybrids have supplied information which led to the solution of the difficulties.

Accordingly, hybrids produced by crossing the two so-called species *Ananas comosus* (L.) Merr. with *A. microstachys* Lindl. have been examined for evidence bearing on this taxonomic problem.

Five pairs of character contrasts have been studied. The two characters, amount of anthocyanin in the leaves and spininess of the leaves, are inherited in an alternative manner. This indicates a single gene difference for each of them. This type of inheritance is typical for variety hybrids and is seldom found in species hybrids.

The differences in acid content, Brix content (sugars), and weight of fruits have each shown a polymeric (blending) type of inheritance which indicates that these characters depend upon a number of interacting genes.

This polymeric type of inheritance is characteristic of crosses between species. It is also frequently met with in varietal hybrids involving such quantitative characters as size, weight, or quantity.

The two forms (species ?) considered here each have 50 chromosomes as the diploid number and the hybrids are fertile.

In morphology, the two forms appear to be sufficiently distinct to justify specific classification, but the weight of genetic evidence at present available is in favor of a varietal classification. (Illustrated with specimens and charts.)

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## THE FORMATION AND MOVEMENT OF THE CARBOHYDRATE AND ORGANIC NITROGEN PRODUCTS IN THE VARIOUS ORGANS AND TISSUES OF THE PINEAPPLE PLANT

By

C. P. Sideris, B. H. Krauss, and H. Y. Young

Analyses of the various tissues of pineapple plants have given us results which indicate that different groups of leaves and tissues of the same leaves function differently in their rate of carbohydrate and nitrogen metabolism, the older tissues functioning more slowly than the younger tissues. The assimilation of carbohydrates, namely sugars, and of amino-acid nitrogen increases toward the basal tissues of the leaves and decreases toward the apical ones on account of the synthesis of new tissues in the basal portions, and the synthesis of sugars and possibly amino acids in the apical.

Treatments with different quantities of ammonium sulfate are reflected in the tissues of pineapple plants by the formation of somewhat corresponding quantities of amino acids. With greater quantities of amino acids, the sugar content at the basal tissues of young leaves decreases because of an increased rate of assimilation; with lower quantities of amino acids this condition is reversed.

The production of sucrose seems to be inhibited by great concentrations of amino acid nitrogen in the tissues. The results, if we interpret them correctly, indicate that sucrose is formed in tissues with and without chlorophyll. In these investigations we have found certain leaf tissues lacking entirely in sucrose but containing great quantities of reducing sugars, which tends to support the theory that the first sugar of photosynthesis is a hexose.

The curves which we have obtained for the distribution of amino-acid nitrogen are almost identical with those we have obtained for sugars. This condition suggests the possibility of amino acid formation in the leaves. We wish not to make a definite statement to this effect, however, until we have accumulated more information. (Illustrated with charts.)

## CELLULOSE FROM BAGASSE

By

LEONORA NEUFFER BILGER AND JOHN N. S. WILLIAMS

The fine fractions of bagasse produced in the crushing of cane were investigated for their cellulose value. The Cross and Bevan method, with modifications, was used to obtain cellulose from dry samples of bagasse. The product was shown to be a ligno-cellulose. The yield was about 50 per cent. The procedure involved boiling the dry material with approximately 2 per cent sodium-hydroxide solution, treating the product first with sulphurous acid and then with chlorine gas, washing, and drying at 60 to 70 degrees.

The "Cross and Bevan cellulose" thus obtained was separated into alpha, beta, and gamma celluloses, and their percentages found to be 59.06, 36.08, and 5.71 respectively. The determination was made by dissolving the beta and gamma forms in 17.5 per cent sodium-hydroxide solution and weighing the undissolved alpha which was filtered off. Beta and gamma were then determined together on one portion of the filtrate by titration with ferrous ammonium sulphate in the presence of potassium dichromate and sulphuric acid, using potassium ferricyanide as an indicator. Beta cellulose was precipitated from a second portion of the filtrate and the gamma form determined by titration. The per cent of beta was obtained by difference. The results showed that cellulose from bagasse compares favorably in its alpha cellulose content with western yellow pine.

The economic possibilities of utilizing the fine fractions of bagasse as a source of cellulose were discussed in connection with the quantities of fresh water that would be needed to carry on the project. (Illustrated with samples.)

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## COPPER CONTENT OF HAWAIIAN FOODS

By

EARL M. BILGER AND ROBERT R. THOMPSON

Since 1929 a number of workers have demonstrated that copper is a valuable supplement to iron in the building of hemoglobin. Foods are the primary source of copper for most people. Consequently a knowledge of the amount of copper present in foods may make it possible to supplement diets low in copper, as milk, cereals, and cereal products.

The presence of copper in Hawaiian foods in small amounts is to be expected, as copper is found in the analyses of 15 out of 18 volcanic rocks of the islands. A basalt from the Waianae Mountains of Oahu contains as much as 0.48 per cent copper oxide.

In the present investigation McFarlane's modification of the Callan and Henderson colorimetric method, using sodium diethyldithio-carbamate was adopted. This reagent produces a copper salt which gives with isoamyl alcohol a deep golden-yellow solution.

The procedure involved was: 1, washing the samples to remove adherent dirt; 2, drying to expel moisture; 3, ashing to destroy carbonaceous matter; 4, treating chemically to remove interfering substances and to transform the copper to the yellow carbamate; 5, comparing in a colorimeter the depth of color of the isoamyl solution with solutions containing known amounts of copper.

Twenty-three food products were analyzed. The percentages of copper in the food materials dried to constant weight at 100 degrees centigrade were found to be: ginger, 0.00120; bean sprouts, 0.00177; poi, 0.00020; egg plant, 0.00148; watercress, 0.00061; string beans, 0.00169; lima beans, 0.00235; Chinese cabbage, 0.00114; carrots, 0.00175; sweet potatoes, 0.00107; Irish potatoes, 0.00055; squash, 0.00175; lettuce, 0.00156; tomatoes, 0.00420; coffee beans (green), 0.00184; guava, 0.00065; bananas, 0.00059; yams, 0.00082; lotus, 0.00054; pineapple, 0.00020; avocado, 0.00058; papaia, 0.00020; opihi, 0.00042.

The results indicate the presence of copper in Hawaiian vegetables and fruits in quantities which compare favorably with those of mainland products. (Illustrated with charts.)

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## SOME SEROLOGICAL OBSERVATIONS

By

NILS P. LARSEN AND OLGA FULTON

The vast economic importance that venereal diseases assume in any community is indicated in table 1. Doctors in Honolulu, though required by law to report every case of chickenpox, are supposed to regard syphilis as a great secret sin and it is therefore kept hidden.

Table 1. Number of Sick Days from Various Diseases, U. S. Navy, 1932. (Annual Report of the Surgeon General)

Average daily strength of the Navy, 110,717

| | |
|---|---|
| Gonococcus infection | 120,410 |
| Syphilis | 56,061 |
| Tuberculosis | 37,956 |
| Appendicitus, Acute | 30,665 |
| Pneumonia | 7,992 |
| Measles | 1,857 |
| Mumps | 2,126 |
| Scarlet Fever | 1,426 |
| Chickenpox | 1,305 |
| Typhoid Fever | 874 |
| All Injuries | 154,408 |

Table 2 shows the variation in race groups in Hawaii. The social status of the people tested is approximately the same except for the white American. If we consider race improvement as one of the projects worth while in human effort the knowledge of the prevalence and spread of this disease (syphilis) is necessary.

Table 2. Comparison of Positives in Different Racial Groups.

| | Per cent |
|---|---|
| Hawaiian | 30.62 |
| Puerto Rican | 16.07 |
| Part-Hawaiian | 13.72 |
| Korean | 12.96 |
| Chinese | 10.17 |
| Filipino | 9.87 |
| Japanese | 7.60 |
| Portuguese | 5.63 |
| White American | 3.22 |

Table 3 is an analysis of proven hereditary cases in a study of the blood of 2,344 newborns at Queen's Hospital. Recently in a Japanese journal records were given from two maternity hospitals showing positive percentages of 7.26 and 8.90 in the newborns. Why the total positive percentage is so low in our newborns we do not know, but the results of this work open many new and interesting possibilities for future study.

Table 3. Results of Tests on 2,344 Placental Bloods

95.20 per cent negative in both Kolmer and Kahn tests
1.10 per cent positive in both Kolmer and Kahn tests
1.58 per cent positive in either Kolmer or Kahn test
2.12 per cent anti-complementary or doubtful

A fourth table was shown which indicated variations due to the personality equation of the technicians. Such tables may be of use in evaluating workers. (Illustrated with charts.)

## BIOLOGICAL RECORDS WITH MOTION PICTURES

By

RAY J. BAKER

The "talk" consisted of the showing of two reels of motion pictures, with a few brief words of explanation. The first reel showed the life histories of the Monarch butterfly (*Danaus archippus*) and the silkworm (*Bombyx mori*). The second reel showed the development of the flowers of the pineapple, speeded up 6,000 times, condensing the events of 20 days into a few minutes. This reel ended with views of the opening and closing of the flowers of hibiscus and night-blooming cereus.

## MEMBERS

Abel, Francis A. E.
Abel, Marjorie G.
Adams, Romanzo
Agee, Hamilton P.
Aitken, Robert T.
Allen, Oscar N.
Andrews, Carl B.
Arnold, Harry L.
Ayres, Arthur
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Fletcher, Desmond R.
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Fronk, Clarence E.
Fujimoto, Giichi
Fullaway, David T.
Fulton, Olga
Gantt, Paul A.
Gregory, Herbert E.
Hadden, Fred C.
Hamre, Christopher J.
Hance, Francis E.
Handy, Edward S. C.
Harry, John V.
Hartt, Constance E.
Hammond, W. H.
Henke, Louis A.
Holmes, Henry
Hosaka, Edward Y.
Illingworth, J. F.
Ito, Kiyoshi
Jaggar, Thomas A., Jr.
Johnson, Horace
Jones, Austin E.
Jones, Martha
Judd, Albert F.
Judd, Charles S.
Katsuki, Ichitaro
Keller, Arthur R.
Kerns, Kenneth R.
Kim, Bernice B. H.
King, Norman
Kirkpatrick, Harry A.
Koehler, Lucy J.
Krauss, Beatrice H.
Krauss, Frederick G.
Kutsunai, Yakichi
Lam, Margaret
Larrabee, Louise M.
Larrison, G. K.
Larsen, Nils P.
Lennox, Colin G.
Lind, Andrew W.
Linford, Maurice B.
Livesay, T. M.
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