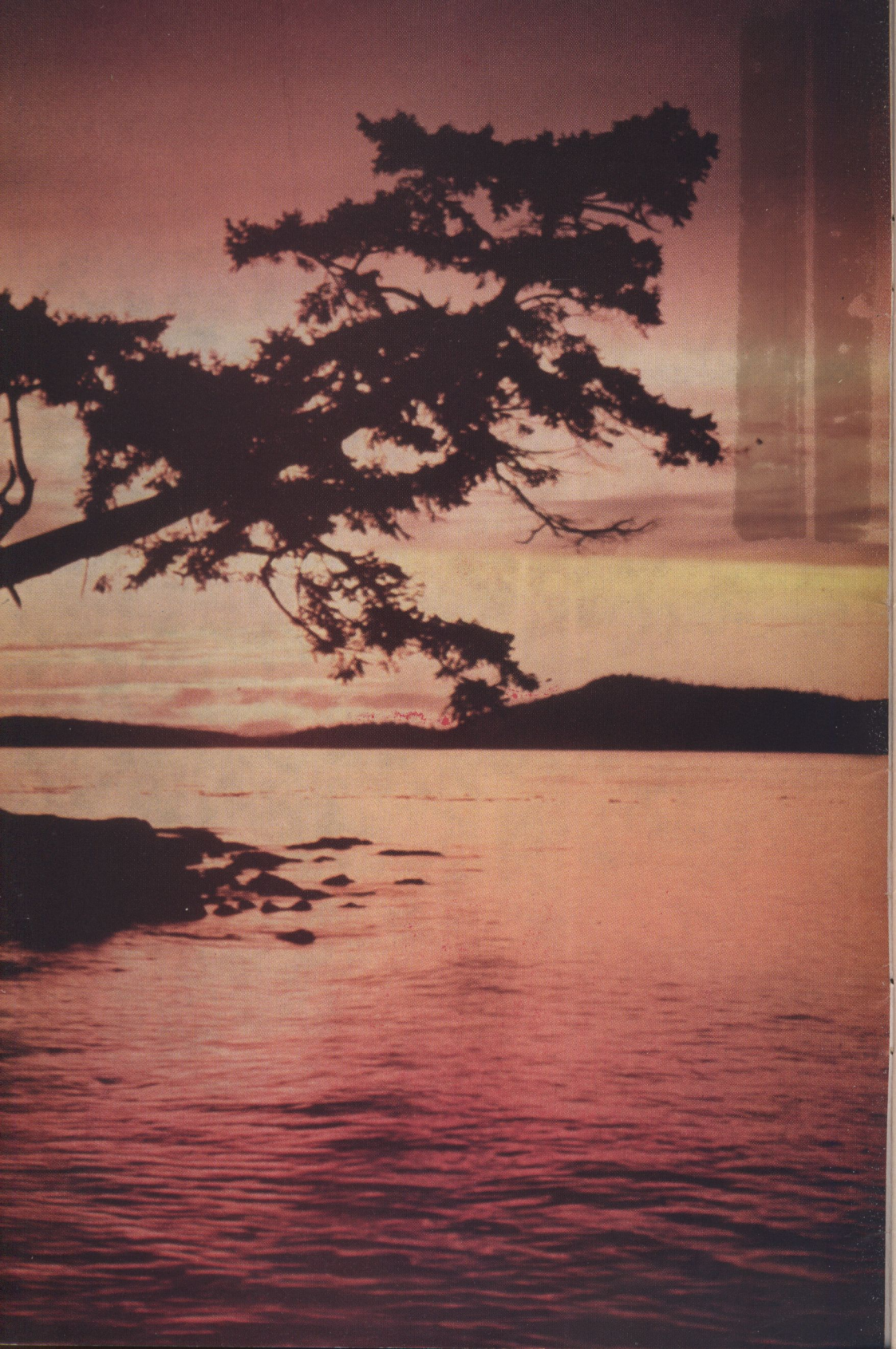
WALLA WALLA COLLEGE
1950 - 1951 BULLETIN

The Graduate School of Biological Sciences

and

Walla Walla College Biological Station



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BULLETIN

The Graduate School of Biological Sciences

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Walla Walla College Biological Station

VOLUME LVIV September 1950 NUMBER 2

Entered as second class matter at the post office at College Place, Washington, under the Act of Congress of August 24, 1912.

CALENDAR

SPRING QUARTER, 1950

Registration of new students	Sunday, March 26
Instruction begins, 7:30 a.m.	Monday March 27
Instruction ends, 12:00 noon	Friday, June 9
Commencement, 10:00 a.m.	Sunday, June 11

SUMMER QUARTER, 1950

Registration, 1:00 p.m.	Friday, June 16
Instruction begins, 8:00 a.m.	Sunday, June 18
First term ends	Friday, July 21
Registration for second term, 1:00 p.m.	Friday, July 21
Instruction begins, 8:00 a.m.	Sunday, July 23
Second term ends	Friday, August 25

AUTUMN QUARTER, 1950

Registration	Sept. 25-28
Classes begin, 7:30 a.m.	Friday, Sept. 29
Thanksgiving recess	Thursday, Friday, Nov. 23, 24
Instruction ends, 12:00 noon	Wednesday, Dec. 20

WINTER QUARTER, 1951

Registration of new students	Tuesday, Jan. 2
Instruction begins, 7:30 a.m.	Tuesday, Jan. 2
Instruction ends, 12:00 noon	Thursday, March 22

SPRING QUARTER, 1951

Registration of new students	Sunday, March 25
Instruction begins, 7:30 a.m.	Monday, March 26
Instruction ends, 12:00 noon	Friday, June 8
Commencement, 2:00 p.m.	Sunday, June 10

Faculty of the Graduate School of Biological Sciences

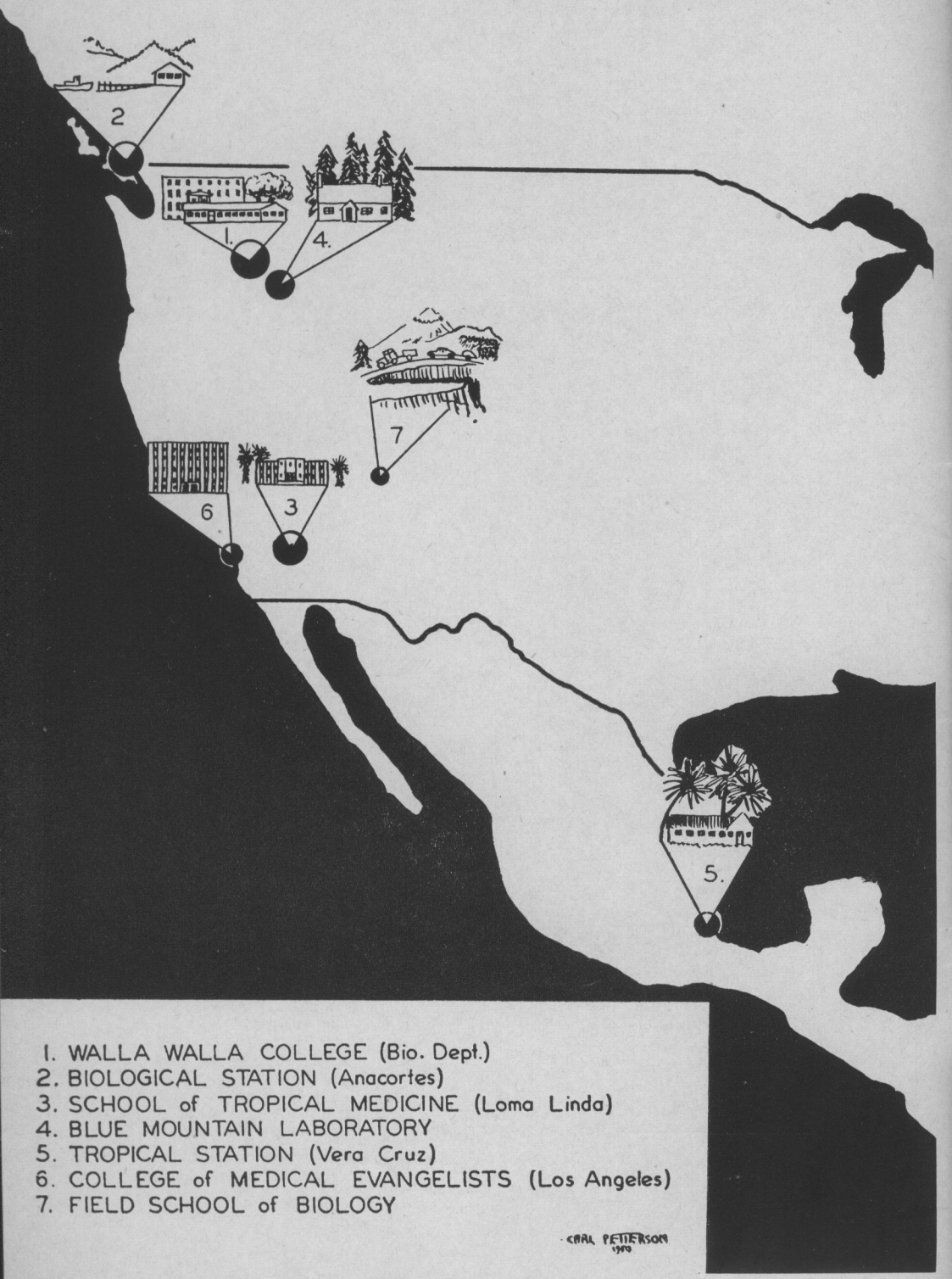
ADMINISTRATION

GEORGE WINFIELD BOWERS, Ph.D., *President*
HENRY L. SONNENBERG, Ph.D., *Dean*
IRENE SMITH-BLACK, B.A., *Registrar*
HARVEY C. HARTMAN, M.A., *Business Manager*
ANNA L. BLACKNEY, B.S. (L.S.), M.A., *Librarian*

INSTRUCTIONAL

LAURENCE M. ASHLEY, Ph.D.
Professor of Zoology
*CLOICE H. BIGGINS, M.D.
Instructor in Physiology
ELWOOD R. BOOTH, M.S.
Lecturer in Zoology
ERNEST S. BOOTH, Ph.D.
Professor of Zoology; Head, Department of Biological Sciences
BEATRICE I. EMERY, M.S.
Assistant Professor of Biology
**HAROLD FUJII, M.S.
Instructor in Parasitology
*OLA K. GANT, Ph.D.
Assistant Professor of Therapeutics
**BRUCE W. HALSTEAD, M.D.
Instructor in Medical Zoology
*KENNETH E. KELLOGG, M.D., D.N.B.
Associate Professor of Physiology
*RAYMOND A. MORTENSEN, Ph.D.
Professor of Biochemistry
**HAROLD N. MOZAR, M.D., D.N.B.
Instructor in Parasitology
C. W. SHANKEL, M.A.
Associate Professor of Chemistry
*MILLARD H. SMITH, M.D.
Instructor in Physiology
CLAUDE E. THURSTON, Ph.D.
Professor of Chemistry
RAYMOND A. UNDERHILL, M.S.
Assistant Professor of Entomology

*Resident at the College of Medical Evangelists, Loma Linda, California.
**Resident at the School of Tropical and Preventive Medicine, Loma Linda, California.



1. WALLA WALLA COLLEGE (Bio. Dept.)
2. BIOLOGICAL STATION (Anacortes)
3. SCHOOL of TROPICAL MEDICINE (Loma Linda)
4. BLUE MOUNTAIN LABORATORY
5. TROPICAL STATION (Vera Cruz)
6. COLLEGE of MEDICAL EVANGELISTS (Los Angeles)
7. FIELD SCHOOL of BIOLOGY

CARL PETTERSON 1970

THE COLLEGE

Walla Walla College is operated by the Seventh-day Adventist denomination, and is fully accredited as a four-year liberal arts college with the University of Washington, the State College of Washington, the Northwest Association of Secondary and Higher Schools, and the Association of Seventh-day Adventist Colleges and Secondary Schools. It is also accredited as a four-year teacher training institution by the Washington State Board of Education.

Walla Walla College is located at College Place, two and one-half miles southwest of Walla Walla, Washington. Two railways enter Walla Walla: the Union Pacific, and Northern Pacific. An hourly bus service connects College Place with Walla Walla. In addition, the Union Pacific Busses stop at the College campus.

Organization and Administration

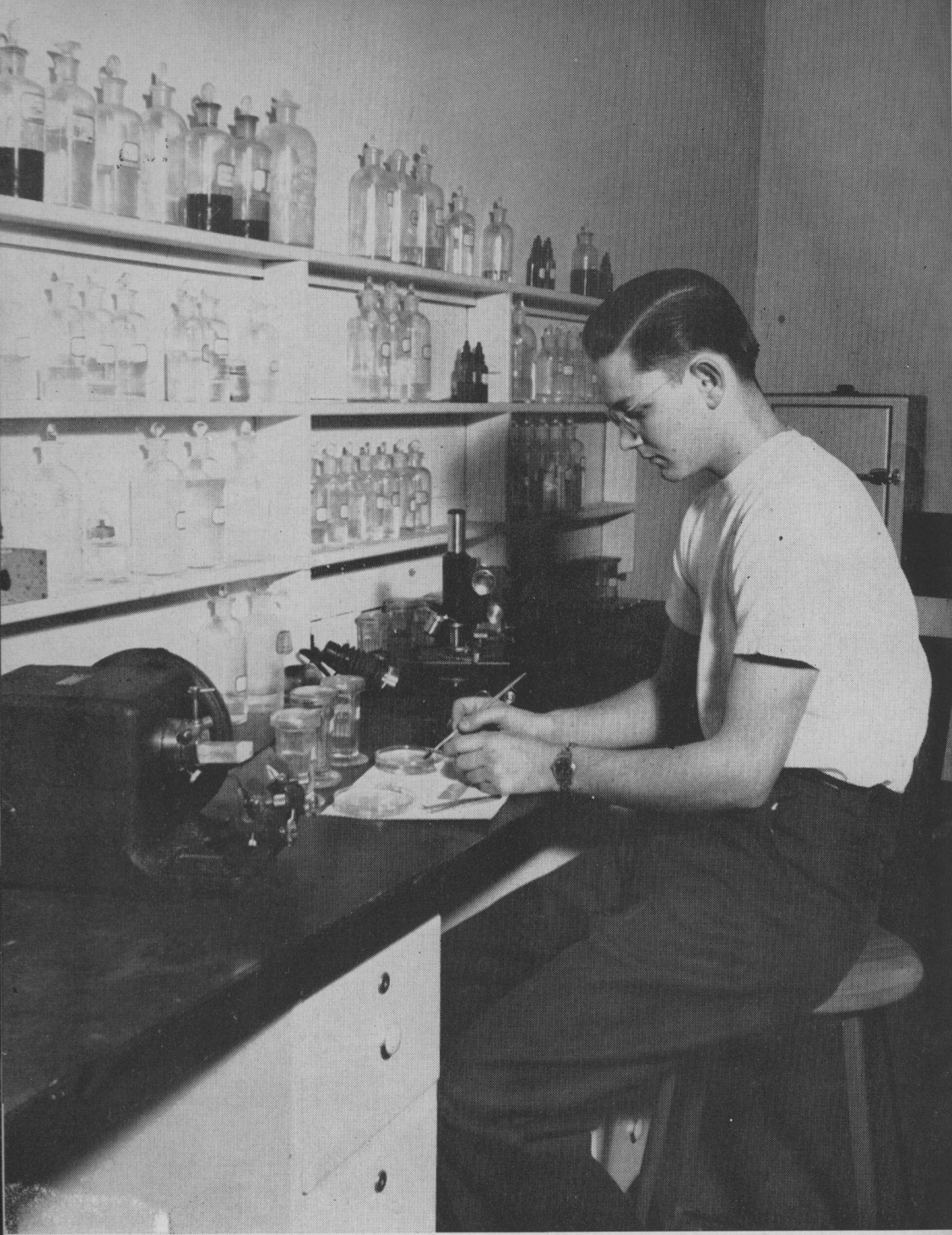
The faculty of the Graduate School consists of the president and the dean of the college, members of the faculty of the departments of chemistry and biological sciences, and certain members of the faculty of the College of Medical Evangelists and the School of Tropical and Preventive Medicine, both of Loma Linda, California.

Opportunities for Graduate Study

Opportunities for advanced work are open to those interested in broadening their knowledge or professional training, or those seeking advanced degrees. Those not interested in advanced degrees may enroll for graduate courses for which they have adequate prerequisites.

The equipment of the department of Biological Sciences includes the latest models of microscopes and microtomes. Adequate space for laboratories and research is provided. The museum includes fine series of mammals, birds, insects, invertebrates and plants. The library, while not extensive, is being enlarged rapidly. Full access to the large libraries of the State College of Washington and the University of Washington supplement that of Walla Walla College.

The work offered in the department of biological sciences of Walla Walla College will be largely in the following branches of the science: animal morphology, animal parasitology, histology and microtechnique, physiology and nutrition, medical zoology, entomology, ornithology, mammalogy, ichthyology, marine invertebrates, ecology, plant morphology, and plant taxonomy.



A corner of the Microtechnique laboratory

Special opportunities are offered for field work through the Biological Station at Anacortes, Washington (see part II of this bulletin), through the Blue Mountain Laboratory, and through the Field School of Biology—a traveling school operated at intervals. The graduate school is affiliated with the School of Tropical and Preventive Medicine and the School of Medicine of the College of Medical Evangelists of Loma Linda, California, and additional field experience may be obtained in its Mexico stations and elsewhere. Also graduate students interested in medical zoology, physiology or nutrition may carry on part of their courses or research with the College of Medical Evangelists.

Fields of Graduate Study

The main fields for graduate study featured by the department of biological sciences are surveyed here in order to give the prospective student an idea of the fields from which he may choose his graduate research.

Animal Morphology. This includes a study of the structure of vertebrate or invertebrate animals either marine, fresh water or land. Living animals may be studied in animal rooms, aquaria, terraria, outdoor pens and in running sea water.

Undergraduate preparation should include invertebrate and vertebrate zoology, histology and microtechnique, genetics and physiology. Strongly recommended courses are organic and biological chemistry.

Parasitology. The study of parasitology is becoming more prominent in a study of diseases of man and animals and in the control of pests. Preliminary training for this study, undergraduate and graduate, should include comparative anatomy, histology and microtechnique, embryology, physiology, organic chemistry, mammalogy, ornithology and icthyology.

Histology and Microtechnique. The histology of many animals in the western states needs a great deal of original work and thorough training in technique is a prerequisite. A separate well-equipped laboratory is maintained for this study.

Physiology and Nutrition. This field of study cannot be over emphasized today. Work with laboratory animals is fundamental. A considerable part of the students' time is spent at the College of Medical Evangelists. Preliminary studies should include physiology, nutrition and biological chemistry.

Medical Zoology. This study is concerned with diseases of man caused by the effects or presence of other species of animals. Of considerable importance in temperate climes it is of great importance in the tropics. Therefore, much of the work is carried on in tropical stations.

Students of medical zoology should be willing to undergo conditions of hardship in wilderness and tropical regions. They should have adequate preparation in vertebrate and invertebrate zoology, botany and chemistry as well as field work, ecology and field methods.

Entomology. The study of insects is possibly the most important single branch of zoology today since insects make up more than three-fourths of all known species of animals and cause so much damage to man, his crops and his domestic animals. Medical entomology relating to disease transmission by insects, economic entomology relating to insect destruction of crops and taxonomic entomology relating to identification and classification may be elected by the student.

Very little work in entomology has been undertaken in Eastern Washington. The Blue Mountain Laboratory (described on page 12) has been built for this purpose and will house ten to twenty students in any season.

A portion of the Museum Collections

← Graduate students in one of the ten research laboratories

Ornithology. Facilities for the study of birds are excellent in the Blue Mountain Laboratory and the Biological Station. A large museum collection of birds and eggs together with equipment for photography and recording provides adequate experience. Life histories and habits are stressed.

Mammalogy. Field and laboratory study of mammals is stressed. The largest collection of mammals in the Northwest is found in our museum. The animal house and pens, the Blue Mountain Laboratory, the Biological Station and the Field School provide adequate facilities and areas of observation for carrying out life history work.

Icthyology. The study of marine fish is abundantly provided for at the Biological Station on Puget Sound. The laboratories have fresh and salt running water and tanks for live specimens. Large collections of fish supplemented by field experience with commercial fishermen are helpful in study. Boats, seines, dredges and other equipment are provided.

Marine Invertebrates. The San Juan islands provide breeding grounds for an abundance of marine animals. Strong tides, protected areas, mud flats, sandy beaches and rocky coasts make many varied habitats. Plankton is abundant. Very little biological work has been done in the area.

Ecology. Walla Walla College is located in a semi-arid region. Rainfall from five inches to seventy-five inches occurs within a thirty-mile radius, while three hundred miles to the West there is a two-hundred inch rainfall. The Cascade Mountains, the Blue Mountains and the Wallowa Mountains are within easy reach with altitudes up to 14,000 feet. Nearly every habitat except tropical may be found within a day's drive from the College.

Morphology of Plants. Plant morphology is not a popular field, but it is important to the field of botany. Anatomical studies of sea weeds, mushrooms, lichens, bryophytes, and seed plants are all possibilities for research topics. Emphasis in morphology is placed upon life histories, and many of the plants of the Northwest are unknown as far as life histories are concerned. The rearing of these plants can be carried out in the laboratory, or in the field. A greenhouse near the biology building will be of great help in this work.

Taxonomy of Plants. There is not one book in print dealing with the plants of the entire Northwest. Much work is needed in classification and identification of the plants of this area. There are new

species to be discovered and described. There are many of these in the lower plants, and some in the seed plants as well. Many areas of the Northwest have never been worked botanically, while many others have been insufficiently studied. The distribution of many a flowering plant is unknown. Students might consider work on nearly any group of plants as a possibility in this field.

There is a great need for field manuals for plants of the Northwest, and a group of students could begin work on such a project, one taking one group of plants, and others taking other groups. Concerted work of this kind might result in the production of a field manual covering the Northwest.

Degrees Offered

The degree of Master of Arts with a major in zoology is offered at present. Minor fields are botany and chemistry.

Facilities for Graduate Study

The physical equipment and buildings used by the department of biological sciences is extensive. A brief description of these facilities follows, including illustrations. The main building on the campus of Walla Walla College includes approximately 9000 feet of floor space, with a total of 30 rooms, including 7 laboratory rooms, museum, two photographic darkrooms, 10 graduate research rooms, four teachers offices, a large stock room, and a store room where trailers, tents, cooking equipment, and other field equipment for the Biological Station and the Field School is stored during the winter or when not in use. An animal house with rooms for preserved animals, live animals, and built-in pens with both ground and underground sections stands near the main building. The room for living animals is heated automatically for controlled experiments. A greenhouse is under construction this year for use for work in botany and entomology.

Biological Station

Located at Anacortes, Washington, 350 miles to the northwest, is the Walla Walla College Biological Station. This station includes two dormitories of 25 rooms each, five cabins, a laboratory building with four laboratories, and other facilities, situated in a cove which is isolated from everything else by water and timber. A small lake, a marsh, mud flats, and rocky and sandy beaches are nearby. Virgin timber occurs only a few feet away. An additional laboratory building is scheduled for construction soon, as well as a sturdy pier to replace the floating dock in use at present. See part II of this bulletin for more complete information regarding this station.

Blue Mountain Laboratory

This is the most recent addition to the facilities of the department of biological sciences. It includes a lodge 30x50 feet for living quarters, housing a total of 32 people, and a laboratory building equipped for entomological work chiefly. The buildings are located on a 6-acre tract of heavy timber 35 miles southeast of the college, and on an all-weather road. While the snow reaches a depth of 11 feet here in winter, cars may be parked along the highway and students may reach the laboratory by walking about one block, or by the use of skiis. In this laboratory work with insect pests of the forest trees will take most of the attention of students, but many other studies may be carried on here as well; for example, work with parasites, birds, mammals, trees, and flowering plants, as well as mushrooms, lichens and other groups of plants.

The lodge at the Blue Mountain laboratory

Field School of Biology

The Field School is a traveling school which has no particular destination as a permanent goal. Trips to different areas have been made in the past; for example: 1938, Cascade Mountains; 1939, Cascade and Blue Mountains; 1941, the states of Idaho, Nevada, Utah, Arizona and California; 1946, the Canadian Rockies and Glacier Park, including Waterton Park, Banff, Jasper, Yoho and Kootenai Parks in Canada.

A field trip to Mexico is planned for the winter quarter, 1951. All interested students should apply to the head of the department of biological sciences as soon as possible, for only 15 students will be included.

School of Tropical and Preventive Medicine

Affiliation with the School of Tropical and Preventive Medicine of the College of Medical Evangelists, provides much additional experience for students who are interested in parasitology, medical zoology, physiology and nutrition. The equipment and facilities of the school include several laboratories in the school proper, plus the additional facilities of the School of Medicine located at Loma Linda and at Los Angeles, California. Large collections of parasites and of animals and plants of medical importance are maintained, as well as much library material.

Tropical stations are operated by the School in Mexico. During the summer of 1949 such a station was operated at Vera Cruz.

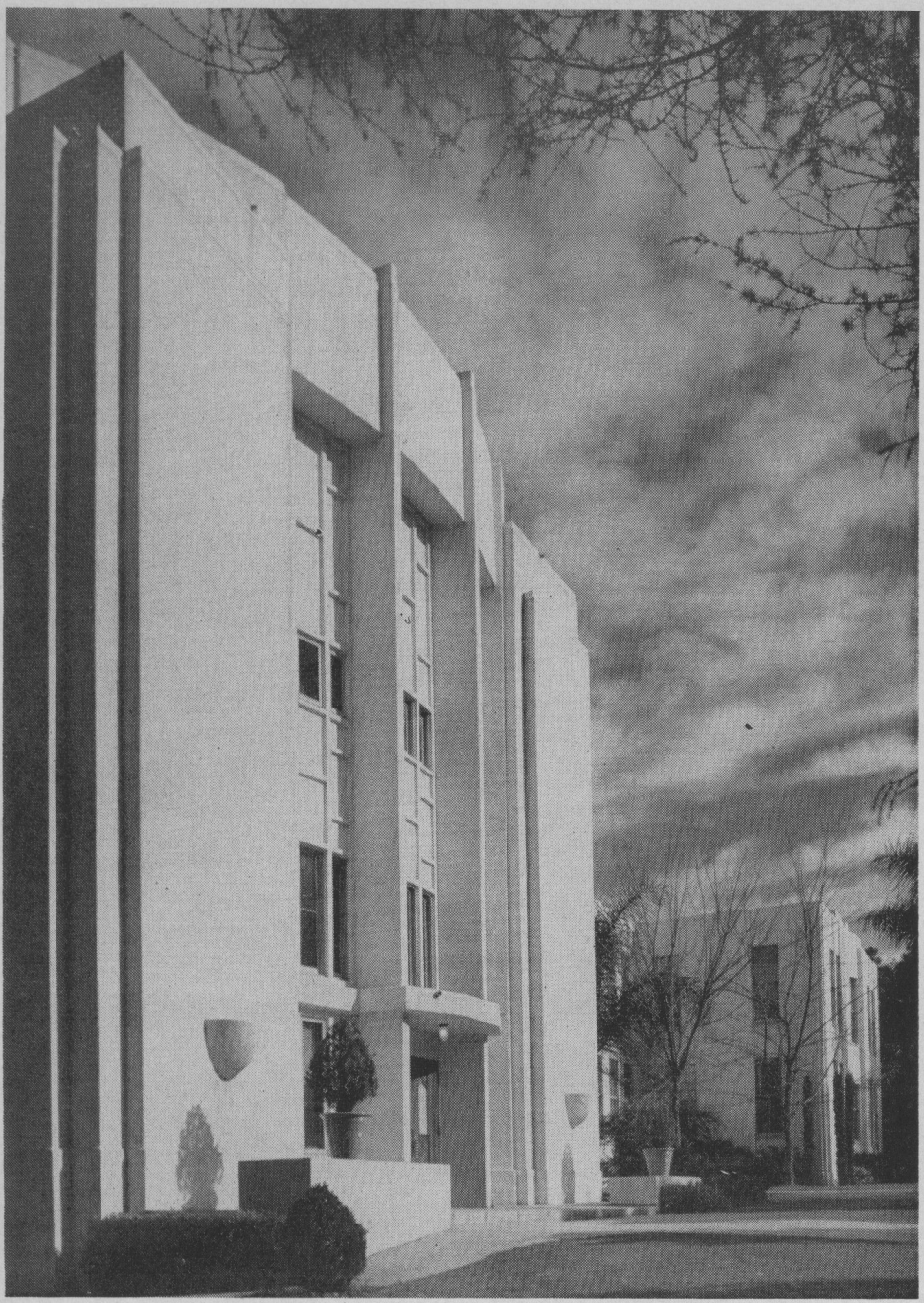
School of Medicine

Affiliation with the School of Medicine at the College of Medical Evangelists includes their facilities at Loma Linda, and at Los Angeles, California. Any student working in physiology and nutrition may wish to take advantage of this affiliation for a part of his work.

Museum of Natural History

The Museum of Natural History so far has featured the vertebrates mainly, for the collections of mammals and birds are most extensive, being the largest in the Pacific Northwest. Collections of reptiles, amphibians, and fishes are being enlarged rapidly. The collection of insects includes approximately 50,000 specimens housed in regulation steel cabinets. Collections of animal parasites are extensive. The herbarium includes several thousand specimens of flowering plants and trees, and many more of the lower plants.

A part of the museum is maintained permanently at the Biological Station, namely, the collections of marine invertebrates and fishes.



College of Medical Evangelists, Loma Linda, California

Expenses

Tuition and laboratory fees are the same as those charged for undergraduate work at the college (see the general bulletin). Fees for research and graduation are charged as follows:

Research, $5.00 per credit hour
Graduation fee, $25.00

Fees charged for study conducted at Loma Linda:

Infirmary fee, $12.00

Other fees as those charged at Walla Walla College.

Living Conditions

Many houses and apartments are for rent in College Place, and it is not usually difficult to obtain a satisfactory place to live. It would be well to contact the head of the department of biological sciences before you arrive in order that you may ascertain the current conditions for housing.

Unmarried students reside in the school dormitories.

Students taking part of their residence work at the College of Medical Evangelists or the School of Tropical and Preventive Medicine will find room in the dormitories if they are unmarried, or in the surrounding village if married. Apartments may usually be secured near the campus.

Fellowships and Scholarships

A number of graduate fellowships are available each year to qualified students. The fellowship provides a substantial part of the expenses for the year, and may pay up to $600 for three quarters in residence at the college. Partial fellowships are also available for those who do not have time for the full fellowship. Students with the full fellowship are permitted to take only 10 hours of school work.

Scholarships may be available in limited numbers for qualified students in fields where their research is of commercial value.

Requirements For the Degree of Master of Arts

Entrance Reqiurements

Graduation from an accredited college with a major in zoology or its equivalent;

Acceptable score on the Graduate Record examination;

A "B" average in the last 15 credits of the major field in the undergraduate work; this must include all the work taken in the major field during the senior year. If the applicants average is less than a "B", he will be admitted on probation only. He must then maintain a "B"

average during the first quarter of residence before he will be granted full graduate status. If he fails to maintain this standard of scholarship he must discontinue his work.

General Requirements

1. A maximum of six years is allowed to complete the work for the degree of Master of Arts.
2. Three quarters in residence are required, one of which must be taken at the Biological Station.
3. A thesis with a maximum of 9 credits and a minimum of 5 credits; two copies must be presented not later than two weeks before the taking of the degree. Regular instruction must be followed for the writing of the thesis.
4. The graduate program is to be approved by the graduate committee of the candidate; this committee will include the major professor, the minor professor, the head of the department of biological sciences, and one member from another department of the college. In the event that the student has done part of his work at the College of Medical Evangelists or the School of Tropical and Preventive Medicine, the committee must include one member from that school.
5. A grade average of "B" must be maintained throughout the graduate residence. No credit will be allowed for courses numbered below 200 in which a grade below B is received; not more than nine credits will be allowed in which a grade of C is earned.
6. A reading knowledge of French, German or Spanish.
7. The final examination may be oral, written, or both.
8. Not more than nine credits may be transferred from another school.
9. A minimum of 12 credits must be chosen from courses numbered 200 or above; the remainder must be chosen from courses numbered from 150 to 199.

Specific Requirements in the Major

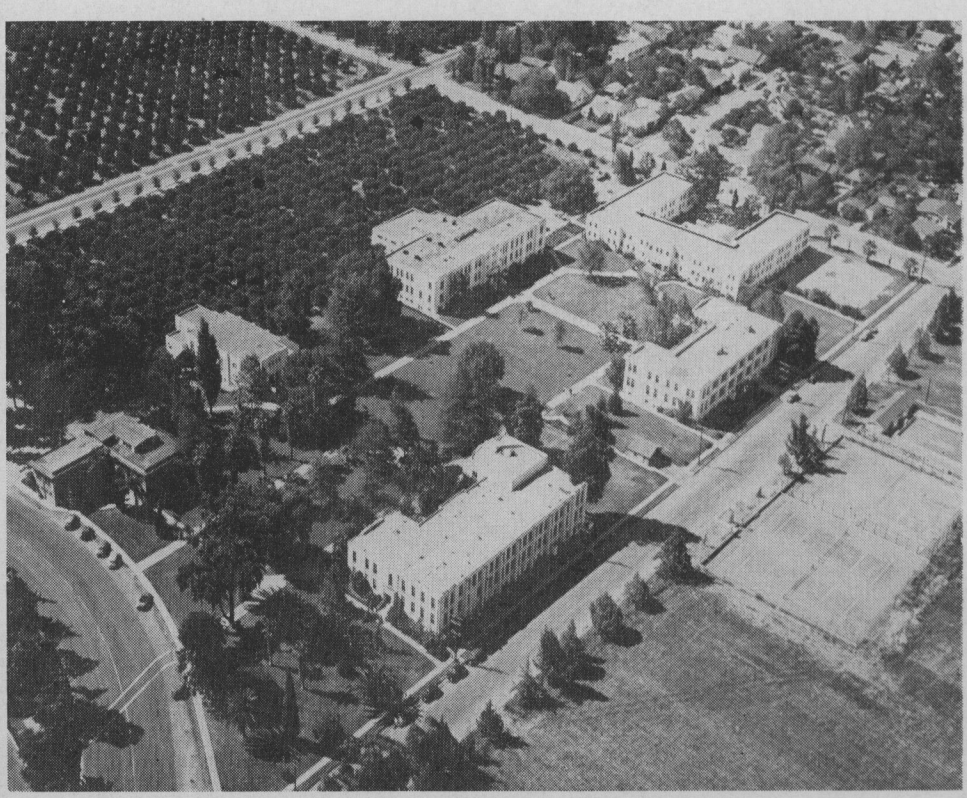
1. 24 credits beyond the undergraduate major in zoology or biology (the undergraduate major must be equivalent to that offered at Walla Walla College).
2. A minimum of 3 credits must be presented in each of the following branches of zoology (including upper division courses in the undergraduate major): embryology, morphology, parasitology, genetics, evolution (including paleontology), invertebrates, entomology, vertebrates, seminar.

3. A scientific background of at least 18 credits in chemistry, physics or mathematics must have accompanied the undergraduate major in zoology.

Specific Requirements in the Minor

The minor may be in botany or chemistry:

1. Botany: a total of not less than 26 credits upper division, of which at least 12 are taken during graduate residence. Courses 106, 164-165 must be included.
2. Chemistry: A total of not less than 18 credits upper division, of which at least 12 are taken during graduate residence. When the minor is chemistry the candidate must elect the following courses in botany in addition to all other requirements: 106, 164-165.



College of Medical Evangelists, Loma Linda, California

Affiliation with the College of Medical Evangelists and the School of Tropical and Preventive Medicine

Students interested in the fields of physiology and nutrition, medical zoology, and parasitology may spend up to one-half of the residence time at the College of Medical Evangelists or the School of Tropical and Preventive Medicine at Loma Linda, California. Here a number of specialized courses in these fields are offered during the regular school year. Opportunity is provided for research toward the thesis, or for research not applying toward the thesis. At least one quarter of residence is required on the campus of Walla Walla College or the Biological Station before the student may go to the Loma Linda campus.

Work in Summer Sessions

The summer terms at the Biological Station (see part II of this bulletin) are designed to provide a strong compliment to the work on the campus toward the degree of Master of Arts. In fact, during most years the summer work will be more liberal due to the fact that staff members from the School of Tropical and Preventive Medicine will offer courses at the Biological Station.

It will be possible for those who are working during the school year to complete all requirements for the Master of Arts by attending the summer terms only—provided they have few or no deficiencies to make up.

Secondary Teacher Training

Training of secondary science teachers is one of the main objectives of the graduate school of biological sciences. All students interested in teaching are urged to qualify for secondary teaching in all fields of science. The following is a list of minimum requirements for denominational certification:

Education: a total of 23 credits selected from the following list:

Principles of Christian Education (required) (54 or 56)	3 credits
General Psychology (57 or 62)	3 credits
Educational Psychology (58 or 63)	3 credits
Principles of Secondary Teaching (134)	2 credits
Special Methods in major subject (197)	2 credits
Secondary Directed Teaching (162)	5 credits
Educational Measurements (136)	3 credits
History of Education	3 credits
Adolescent Life and Problems (137)	3 credits
Secondary School Administration (122)	3 credits

Mathematics: a total of 15 credits in addition to two units in the secondary school training.

Chemistry: a minimum of 9 credits, in addition to secondary background.

Physics: a minimum of 9 credits, in addition to secondary background.

COURSES OF INSTRUCTION

These are courses accepted on the graduate program only; for a complete list of undergraduate courses see part II of this bulletin. All courses numbered 150 and above are acceptable for graduate credit.

151. *Sanitary Bacteriology*, 4 credits, prerequisite, 5-6
*153. *Ornithology*, 4 credits
155. *Systematic Entomology*, 4 credits
*156. *Mammalogy*, 4 credits
157. *Paleontology*, 2 credits
158. *Genetics*, 2 credits
159. *Philosophy of Science*, 2 credits
161-162-163. *Seminar*, ½ credit each quarter
164-165. *Morphology of Plants*, 4 credits each term
*169. *Fresh Water Biology*, 4 credits
175. *Field Ecology*, 4 credits
177-178. *General Parasitology*, 3 credits each quarter
*181. *Marine Invertebrates*, 4 credits
*182. *Ichthyology*, 4 credits
*183. *Marine Botany*, 4 credits
*191. *Forest Entomology*, 3 credits
*192. *Fisheries Biology*, 4 credits
193. *History of Biology*, 2 credits
194-195. *Methods in Research*, 1 credit each quarter
197. *Methods in Teaching Biology*, 3 credits
*199. *Special Problems*, credit arranged

Graduate courses; not open to undergraduates.

*201. *Research in Zoology*, credit arranged
*202. *Research in Botany*, credit arranged
*203-204-205. *Seminar*, 1 credit each quarter
210. *Genetics and Evolution*, 3 credits; prerequisite, 158, 159
*211. *Plant Ecology*, 4 credits; Prerequisite, 106
*229. *Parasites of Marine Animals*, 4 credits; prerequisites, 181, 182, 177-178
*230. *Advanced Animal Parasitology*, 4 credits; prerequisites, 153, 156, 177-178 (CME)
231. *Seminar in Physiology*, 2 credits (CME)
232 *Seminar in Nutrition*, 2 credits (CME)
233. *Seminar in Parasitology*, 2 credits (CME)
234. *Seminar in Medical Zoology*, 2 credits (CME)
235. *Thesis*, 5 to 9 credits

*Offered at the Biological Station, 1950.

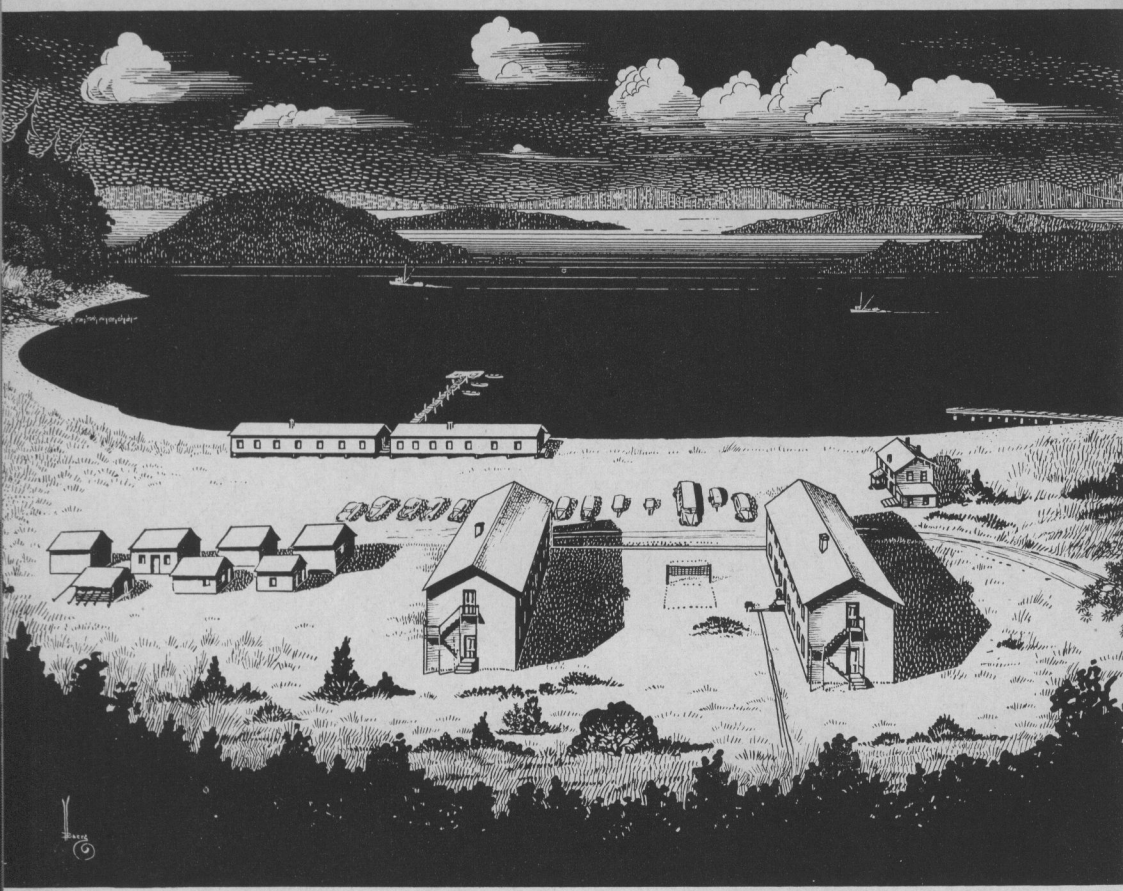
ANNOUNCEMENT

WALLA WALLA COLLEGE BIOLOGICAL STATION

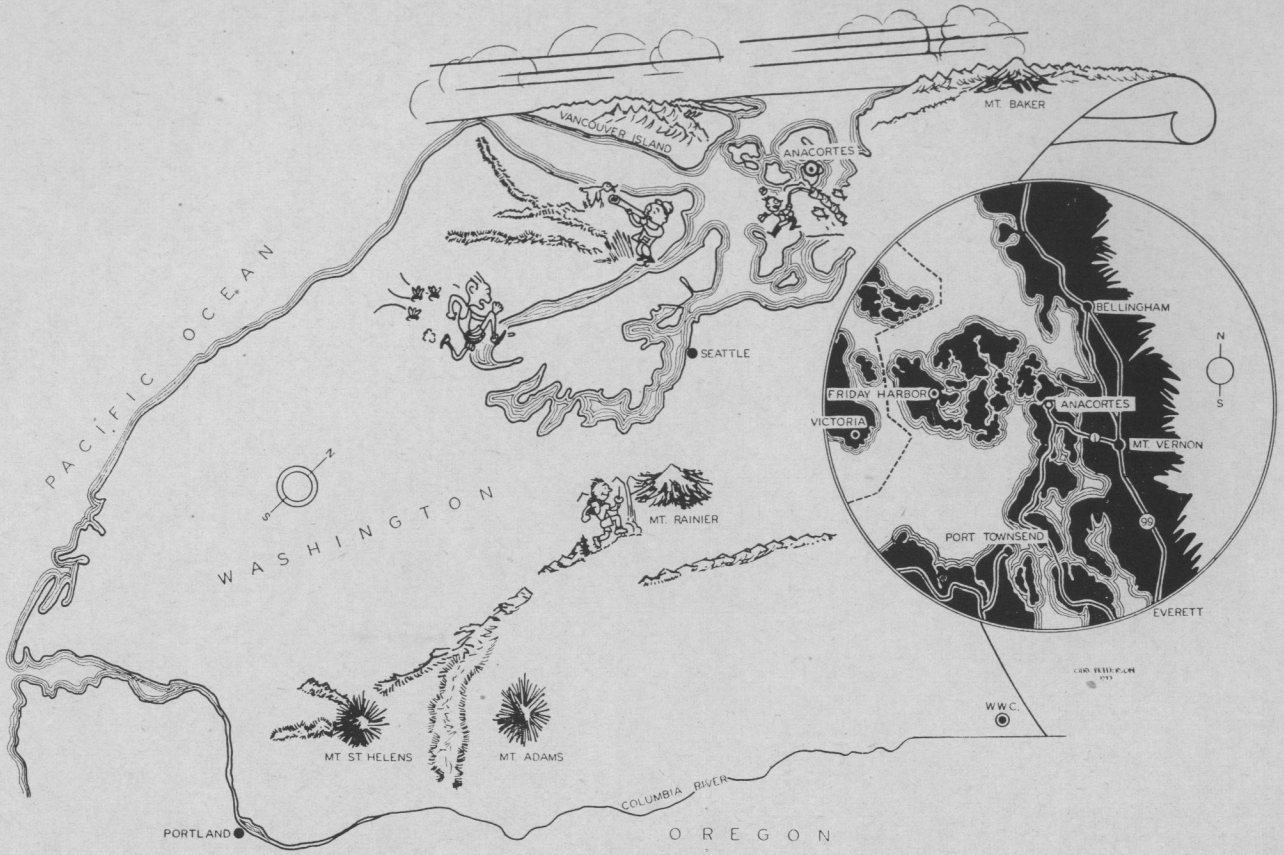
Anacortes, Washington

Season of 1950

June 16 to July 21 July 21 to August 25



The Biological Station, located 3 miles west of Anacortes, is in Ship Harbor, a protected cove surrounded by water on one side and by timber on the other. The caretaker's home, two dormitories, cabins, and laboratory buildings make up the campus of 80 acres. The drawing here shows the appearance of the Station as it will be at the end of the summer, 1950, for the second laboratory building, and 4 of the 8 cabins remain to be constructed during the summer by student labor.



Northwestern Washington, location of Walla Walla College Biological Station

CALENDAR

June 16, 1:00 p.m. ..... Registration for first term
June 18, 8:00 a.m. ..... Classes begin
July 21 ..... Final examinations for first term, and close of term
July 21, 1:00 p.m. ..... Registration for second term
July 23, 8:00 a.m. ..... Classes begin
Aug. 25 ..... Final examinations for second term, and close of term

FACULTY

ERNEST S. BOOTH, Ph.D.
Professor of Zoology, Director of the Biological Station, Head of the Department of Biological Sciences
LAURENCE M. ASHLEY, Ph.D.
Professor of Zoology
RAYMOND A. UNDERHILL, M.S.
Assistant Professor of Entomology
BEATRICE I. EMERY, M.S.
Assistant Professor of Biology
BRUCE HALSTEAD, M.D.
Instructor in Medical Zoology (School of Tropical and Preventive Medicine)
ELWOOD R. BOOTH, M.S.
Lecturer in Marine Invertebrates

General Information

How to Reach the Biological Station

If traveling by automobile you will follow highway 99 north from Seattle to Mount Vernon, then turn west at Mount Vernon on the only highway to Anacortes. After reaching Anacortes, turn west (left) on 12th Street and go three miles on the paved road until you see the sign of the Biological Station.

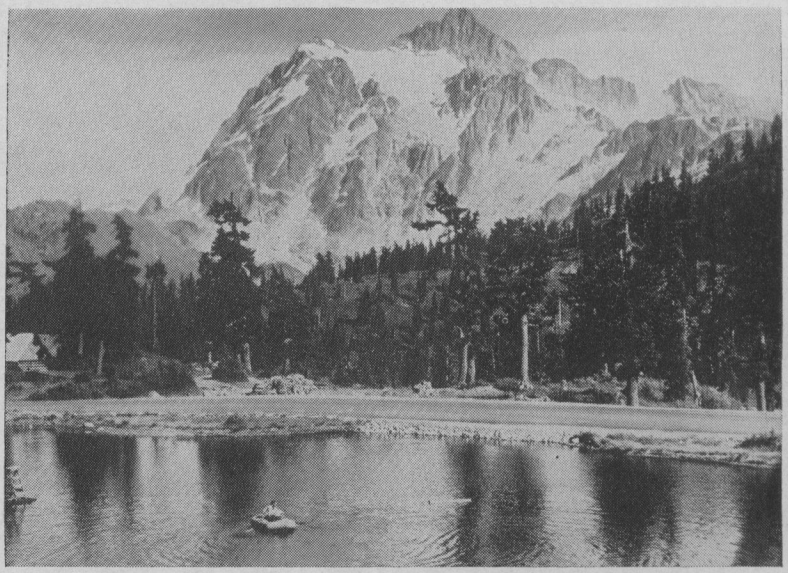
If traveling by train your route will take you to Seattle, then it is best to transfer to Greyhound bus and buy a separate ticket to Anacortes. After you arrive in Anacortes call the WWC Biological Station and we will pick you up and bring you out to the station.

If traveling by bus or by plane, use the same directions given in the paragraph above.

Opportunities for Biological Study

No more fertile territory can be found in North America for the study of plants and animals out doors than the Puget Sound area of Washington state. Within easy reach of the biological station it is possible to find all the habitats for marine animals from the deep sea to the shore zones. The area is one of the most important for commercial fishing, and opportunities for research in fisheries biology are unlimited. Fresh water life is unusually abundant in the hundreds of lakes and streams available to the biological station. A marsh and a small lake are found within a few feet of our buildings, and seven other lakes within five miles. Within a radius of 50 to 100 miles it is possible to find several hundred lakes, not to mention the scores of streams and rivers.

Land animal life is abundant in the Cascade and Olympic Mountains, and in the adjacent valleys. Here the rainfall is adequate to support constant humid life zones so characteristic of the west coast. Yet, in the San Juan Islands is an area where the rainfall may drop to 15 inches, producing unusually arid conditions throughout the summer. Here a species of cactus actually exists on many of the islands, not to mention numerous arid zone species of animals. Because of these varie-



Mt. Shuksan, our favorite camping area in the Cascades

ties of habitats it is possible to find more than 500 species of flowering plants during the summer months, and hundreds of species of other plants.

Two wilderness areas may be found within 85 miles of the station. One is an area hardly explored by man at all. This is a vast expanse of rugged mountains between Mount Baker and the Okanogan highlands. Expeditions by pack animals are planned into this area during the coming summer. The other wilderness is in the Olympic National Park. Here there are no roads, but numerous trails penetrate this region where only the hardier mountaineers dare to venture. Advanced courses in plants and animals will enable students to do original work in these two wilderness areas. There are dozens of species of plants and many species of animals living in these areas which have never been classified by scientists. We plan to find and name these plants and animals as fast as possible.

Unrivalled opportunities exist for the photographer. Here you will be able to take kodachrome pictures that will be the envy of all who see them. High mountain plants and animals will pose for the camera in these wilderness areas where they have never before seen a human being.

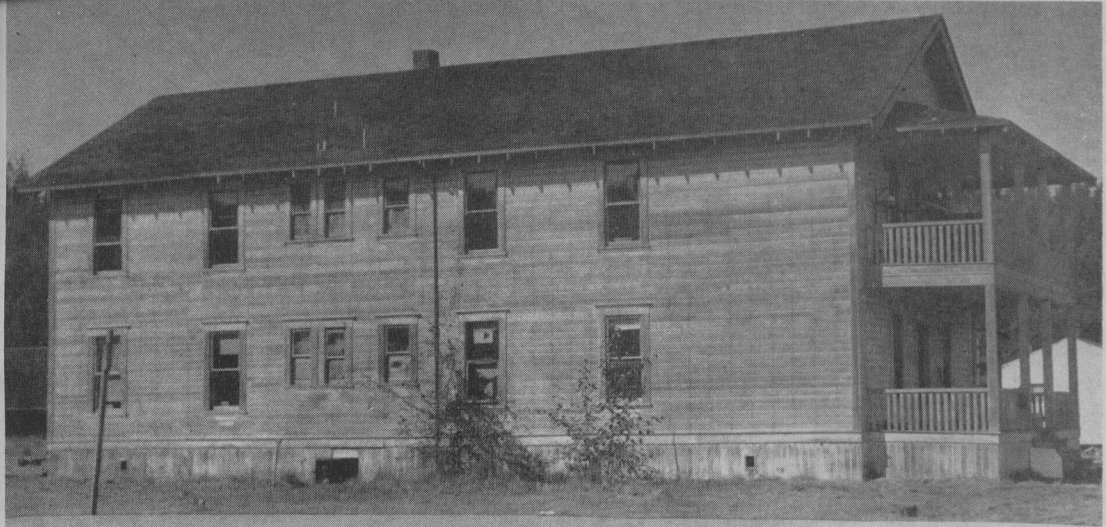
For real investigation of an original nature the area offers unusual opportunities, for very little scientific work has been done in the region. The University of Washington is the only school which has done any work of any extent at all, and their work has been largely in oceanography. Land animals and plants are practically virgin territory for students of the biological station, while marine plants and animals offer nearly as great opportunities.

Facilities and Equipment

Several motor boats are provided for student use, while a cabin cruiser is available at all times. A bus is used for field trips to the mountains. Over-night trips are made into the Cascade and Olympic Mountains, to the San Juan Islands, and to the ocean. Over-night trips are made by boat by members of the classes in ornithology, mammalogy, ichthyology, marine invertebrates, and paleontology.

A new laboratory building provides ample space for all laboratories. It provides marine aquaria with a constant supply of running sea water. Microscopes, slides, dissecting equipment, museum specimens, and all

Right: Upper, One of the dormitories; Center, Cabins for families; Lower, A laboratory building.



the other usual items of equipment for biological work are moved over from the college each summer. A permanent collection of marine specimens remains at the station all the time. A darkroom is provided for those interested in photography.

There are two dormitories, each with 25 rooms. Two students occupy each room in the dormitories. Then, there are several small cabins for married students with families. Trailer space, and camping space is available for those who wish to camp out. Electricity and water are provided for those camping out.

There will be adequate time for recreation. Swimming, boating and hiking will interest many, and there will be opportunity daily for games in the playground area.

Since Anacortes is only three miles away, with paved road and telephone service, there will be no danger arising from emergencies. A nurse will be on hand at all times with adequate first aid supplies.

EXPENSES

Tuition: $42.00 for each term of 4 to 6 weeks. This is a flat rate; there is no reduction for those taking less than full work. Auditors pay the same fees as those working for college credit.

Laboratory Fees: $10.00 for each course of 4 hours or less; $20.00 for each term where 8 hours of courses are taken.

Room rent: $15.00 for each term in the dormitories; cabin rent varies with the type of cabin. Trailer space rent is only actual electricity used.

Board: Flat rate of $11.00 per week for each term or part thereof with a 10% reduction if paid in advance for one or more terms. The board for each week must be paid in advance. There are no exceptions for this, and each one must bring the amount for board with him.

Books and Supplies: These will be on hand at the station, and need not be provided before you arrive. Books will usually cost about $10.00 to $15.00 per term.

Veterans: All veterans will have their records transferred to Walla Walla College in order to obtain government payment for expenses. All expenses are paid for veterans except board, room, breakage, and insurance.

Equipment to Bring

Bedding: Bring plenty of warm bedding, for nights are cool. Beds and mattresses are furnished, but you must bring everything else. A sleeping bag should be provided for over night trips. A waterproof canvas will serve as a make-shift bag by using ordinary blankets inside.

Pup tent or Mountain tent is a good thing to have, for rain is occasional in the summer. Large tents will provide shelter for those who do not wish to bring pup tents.

Dishes: Bring a tin or plastic set of dishes and silverware, for these are not provided. We have found it most efficient for each one to provide and care for his own dishes—washing them each time and keeping them in his room.

Miscellaneous: Bring a musical instrument if you play one. Bring flashlight, sun glasses, mosquito netting, camera, film, Bible, church hymnal, and electric iron if you wish to do your own ironing.

Breakage: A deposit of $5.00 is required; this is refunded at the end of the term if no equipment is broken or damaged.

Laundry: A washing machine is provided for those who wish to do their own laundry. Others may have their laundry done in Anacortes, for a laundry truck will stop twice a week to call for and deliver laundry.

Clothing: Regular school clothes should be worn daily in and about the station, and appropriate clothes for Sabbath services should be included. Everyday shoes should have low heels and sturdy construction. Hiking boots will be a real advantage for field trips, but not required. Rubber boots will be necessary for those taking fresh water biology, ichthyology and marine invertebrates. Rubbers will be useful for rainy weather. Bring a heavy coat, jacket and raincoat with you, and a hat for sun protection. Summers are cool at Anacortes, so be sure to bring adequate warm clothing. A jacket may be worn almost any day even in midsummer.

Health: A registered nurse is in charge of the health service, and first aid equipment will be on hand at all times. No one in poor health should plan to attend the biological station.

Upper left: One of the live-tanks where running fresh and salt water keep animals alive for study.

Upper Right: A 40-pound octopus caught on the station grounds.

Lower: Systematic botany class keying plants.

Insurance: Accident insurance is required of everyone in attendance. A low cost policy may be had from the Mutual Benefit Health and Accident Insurance Company of Omaha (a local agent in nearly every town) for $5.00 for the first three months, and $1.00 a month thereafter. It provides up to $500 benefits for all kinds of accidents. This policy should be taken out early enough so that it is in force when you come to the station.

Sabbath Services: Friday night vespers will be conducted at the Station. We will join with the Anacortes church for Sabbath Services. Be sure to bring your church hymnal.

Living Quarters: Two dormitories with 25 rooms in each will provide most of the living quarters. In addition, there are several cabins for married students with families. Trailer space and camping space is available for those wishing to stay outside the dormitories. It would be possible for some to rent a home or cabin in Anacortes and drive back and forth each day.

General Regulations

Conduct: The general rules of Walla Walla College apply at the Biological Station. Students are expected to conform to these at all times. Failure to do so will bring about dismissal from the station.

Pets: No pets are allowed at the biological station. Dogs and cats in particular cause much damage to ground-nesting birds.

Children: Families with children are welcome at the Biological Station, but their parents must be entirely responsible for them at all times. Children cannot be permitted in the dormitories unless the space is not needed for students. In general, families with children should plan to live in cabins, trailers, camp out, or live in town.

Application and Deposit

No one will be admitted to the biological station who has not previously filed an application and placed a deposit of $15.00 with the director. Deposits will not be refunded in case of concellation after May 1 for the first term, nor after June 15 for the second term. Applicants will be notified of their acceptance. If an applicant is not accepted his deposit will be refunded. The deposit must accompany the application. Since the enrollment is limited to 60 each term it is urgent that each one wishing to attend send in his application just as soon as possible.

Degrees Offered

The degrees of Bachelor of Arts and Bachelor of Science are offered at the Biological station (including work at Walla Walla College) with a major in zoology.

The degree of Master of Arts is offered with a major in zoology.

Requirements for the Degree of Bachelor of Arts or Bachelor of Science with a Major in Zoology

The degree of Bachelor of Arts, or Bachelor of Science is conferred upon students who have fulfilled the following conditions:

1. Complied with all entrance requirements. (For details consult the annual bulletin).

2. Completed one hundred and ninety-two credits of college work as indicated under the various curricula. (For specific requirements consult the annual bulletin). At least sixty credits must be in upper division courses. The senior year's work of at least thirty-six credits must be done in residence.

3. Maintain a C average.

4. Earned at least forty-five credits in a major study in one department and a minimum of twenty-seven credits in an appropriate minor study. A minimum of twenty-one credits of the major study must be in upper division courses. No grade lower than a C will be counted on the major or minor.

5. Satisfied the following specific requirements:

Religion	24 credits
History	9 credits
*Education and Psychology	9 credits
**Language, Ancient or Modern	9-24 credits
Freshman Composition	9 credits
†Literature, Speech	9 credits
Basic Science	12 credits
Elect Chemistry, Physics, Biology, Physiology, or Mathematics	
Vocational	9 credits
Physical Education and Health	6 credits

*Principles of Education required.

**Students not having had language in the secondary school are required to take thirty credits in college.

†May be a combination of 6 credits of Literature and 3 of Speech; or 6 of Speech and 3 of Literature; or 9 credits all Literature in either English or foreign language, or combination thereof.

Requirements for the Major in Zoology

1. A minimum of 48 credits, 25 of which must be upper division.
2. Courses 1-2-3, 14-15, 106, 157, 158, 159, 161-162-163, 193, 194-195.
3. Minor fields should be in chemistry, physics or mathematics. Special permission must be obtained from the major professor for a minor in any other field. (Mathematics should be elected in the freshman year; physics in the sophomore year; chemistry in either the freshman or sophomore year).

Requirements for a Minor in Zoology

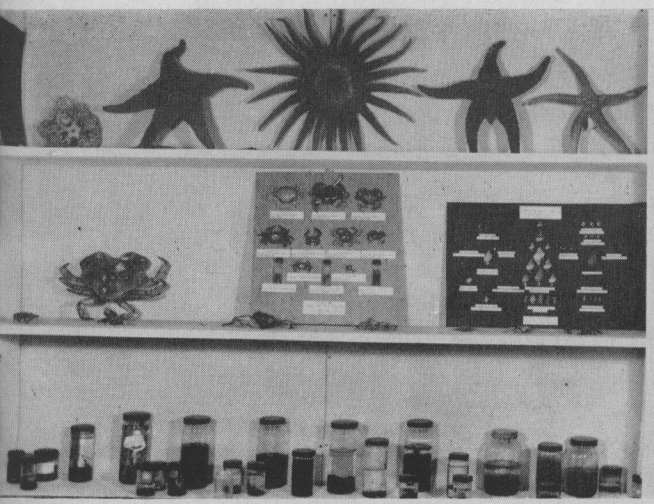
1. A minimum of 27 credits, 12 of which must be upper division.
2. Courses 1-2-3, are required of all minors.
3. Courses 157, 158, 159, 193, 194-195 are highly recommended.

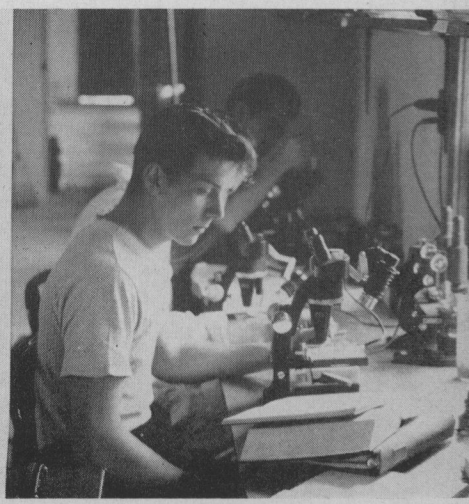
Requirements for a Minor in Botany

1. A minimum of 27 credits, 12 of which must be upper division.
2. Courses 14-15, 106, 164-165 are required of all minors.
3. Courses 157, 158, 159, 193, 194-195 are highly recommended.

Requirements for the Degree of Master of Arts

(See part 1 of this bulletin)





Left: Student collections; Right: One corner of the Marine botany laboratory.

COURSES OF INSTRUCTION

Undergraduate only

1-2-3. *Elementary Zoology*, 4 credits per quarter
*4. *Survey of Zoology*, 4 credits (Restricted to elementary education students)
5-6. *Microbiology*, 3 credits per quarter
14-15. *Elementary Botany*, 4 credits per quarter
*17. *Survey of Botany*, 4 credits (Restricted to elementary education students)
51-52-53. *Anatomy and Physiology*, 4 credits per quarter
103-104. *Comparative Vertebrate Anatomy*, 4 credits per quarter
*106. *Systematic Botany*, 4 credits
113. *Vertebrate Embryology*, 4 credits
121. *Vertebrate Histology*, 3 credits
122. *Animal Microtechnique*, 3 credits
123. *Plant Microtechnique*, 3 credits
133. *General Entomology*, 4 credits
151. *Sanitary Bacteriology*, 4 credits
*153. *Ornithology*, 4 credits
155. *Systematic Entomology*, 4 credits
*156. *Mammalogy*, 4 credits
157. *Paleontology*, 2 credits
158. *Genetics*, 2 credits
159. *Philosophy of Science*, 2 credits
161-162-163. *Seminar*, ½ credit each quarter
164-165. *Morphology of Plants*, 4 credits each quarter
*169. *Fresh Water Biology*, 4 credits
175. *Field Ecology*, 4 credits
177-178. *General Parasitology*, 3 credits each quarter
*181. *Marine Invertebrates*, 4 credits
*182. *Ichthyology*, 4 credits
183. *Marine Botany*, 4 credits
*191. *Forest Entomology*, 3 credits
*192. *Fisheries Biology*, 4 credits
193. *History of Biology*, 2 credits
194-195. *Methods in Research*, 1 credit each quarter
197. *Methods of Teaching Biology*, 3 credits
*199. *Special Problems*, credit arranged

Schedule of Courses Offered, 1950

First term–June 16 *to July* 21

Ornithology
Fresh Water Biology
Ichthyology
Forest Entomology
Survey of Botany
Plant Ecology

***Second** term–July* 21 *to August* 25

Marine Invertebrates
Systematic Botany
Mammalogy
Fisheries Biology

Special term for Elementary Teachers–July 21 *to August* 18

Survey of Zoology

*Offered at the Biological Station, 1950.

INSIDE FRONT COVER
Sunset from the Biological Station, Anacortes, Wash.