

# UNIVERSITY OF MONTANA BULLETIN

STATE UNIVERSITY SERIES

NUMBER 216

## STATE UNIVERSITY SUMMER QUARTER

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### ANNOUNCEMENT FOR THE BIOLOGICAL STATION AT FLATHEAD LAKE



Six Weeks, June 25 to August 7, 1918  
Eighteenth Year

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MAY, 1918

Entered at Missoula, Montana, as second-class matter, under Act  
of Congress, August 24, 1912.

## THE UNIVERSITY OF MONTANA

EDWARD C. ELLIOTT, Chancellor of the University

The University of Montana is constituted under the provisions of Chapter 92 of the Laws of the Thirteenth Legislative Assembly, approved March 14, 1913, (effective July 1, 1913).

The general control and supervision of the University are vested in the State Board of Education. The Chancellor of the University is the chief executive officer. For each of the component institutions there is a local executive board.

### Montana State Board of Education

S. V. STEWART, Governor	Ex-officio, President
S. C. FORD, Attorney General	Ex-officio
MAY TRUMPER, Supt. of Public Instruction	Ex-officio, Secretary
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C. E. K. VIDAL.....(1920)	J. B. KREMER.....(1922)

The University comprises the following institutions, schools and departments:

### The State University, Missoula

Established February 17, 1893, and consisting of

The College of Arts and Sciences	The Biological Station
The School of Law	(Flathead Lake)
The School of Pharmacy	The Public Service Division
The School of Forestry	Special War Courses
The School of Journalism	Military Service Course (1 yr.)
The School of Music	Nurses' Preparatory Course (1 yr.)
The Summer Quarter	Office Training Course (1 yr.)
The Graduate Division	
Edward O. Sisson, President	

### The State College of Agriculture and Mechanic Arts, Bozeman

Established February 16, 1893, and consisting of

The College of Agriculture	The Agricultural Extension Service
The College of Engineering	The Secondary Schools
The College of Applied Science	Home Economics
The College of Household and Industrial Arts	Mechanic Arts
Courses for Vocational Teachers	Agriculture
The School of Music	Special War Courses
The Summer Quarter	Military Service Course (1 yr.)
The Agricultural Experiment Station	Nurses' Preparatory Course (1 yr.)
	Office Training Course (1 yr.)
James M. Hamilton, President	

### The State School of Mines, Butte

Established February 17, 1893

Charles H. Bowman, President

### The State Normal College, Dillon

Established February 23, 1893, and consisting of

The Teachers' Certificate Course	The Four-years Course
The Three-years Course	The Rural Teachers' Course
The Course for Supervisors	
Joseph E. Monroe, President	

For publications and detailed information concerning the different schools and colleges address the President of the particular institution concerned. Communications intended for the Chancellor of the University should be addressed to the State Capitol, Helena, Montana.



## STATION STAFF—1918

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EDWARD C. ELLIOTT	Chancellor of the University of Montana
EDWARD O. SISSON	President of the State University
MORTON J. ELROD	Director, Professor of Biology, Montana State University
PAUL W. GRAFF	Instructor in Botany, Montana State University
GEORGE B. CLAYCOMB	Instructor in Biology, Missoula County High School

## ANNOUNCEMENT

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A station for research and instruction in Biology will be maintained by the Montana State University, for the nineteenth year, during six weeks from June 24 to August 6, 1918. The staff will remain several weeks later for work, and those willing to pursue investigations or study longer than six weeks may do so if they desire.

### LOCATION

The station is located at Yellow Bay, midway on the eastern shore of Flathead lake, on a tract of 90 acres of virgin forest owned by the University. This land was given by act of Congress for biological investigation. The park to park automobile road runs through the grounds and past the buildings. The station land has nearly a mile and a half of shore line. To the east the Mission Mountains rise quite abruptly from the lake to a height near the station of about 7,000 feet. The lake elevation is 3,000 feet.

Beside this tract the station has two other sites of forty acres each, one on Idlewilde Island, the other on Wild Horse Island. Both of these are used during the summer. In addition the Flathead Lake Bird Reserve Islands belong to the station.

The topography near the station is such as to afford a variety of floral and faunal conditions. From the deep lake to high mountain top is an extreme which very few places can present.

### BUILDING AND EQUIPMENT

The laboratory is of brick, two stories, built in 1912. It is 30x40 feet, with cement floor below. The first floor is fitted with laboratory tables and has a dark room. The second floor is used for stock and store room, for lectures, and for investigation. One room has been used by the director for living quarters. Water is piped to both stories.

Compound microscopes are taken to the station from the Montana State University; so also are necessary glassware and supplies. Only the ordinary material is supplied. Those desiring special apparatus should write to the director.

The station has its own motor boat, capable of carrying 18 people. Travel is thus possible at any time when lake conditions are suitable. It has also a smaller 16-foot motor boat and two row boats. Collecting apparatus for general use is supplied.



## LIBRARY

A small but useful library is provided, containing important books dealing with the life of the region. Many important government publications have been secured. Authors have contributed reprints in considerable number. Others are solicited. A limited number of necessary books is taken to the station every year from the University library.

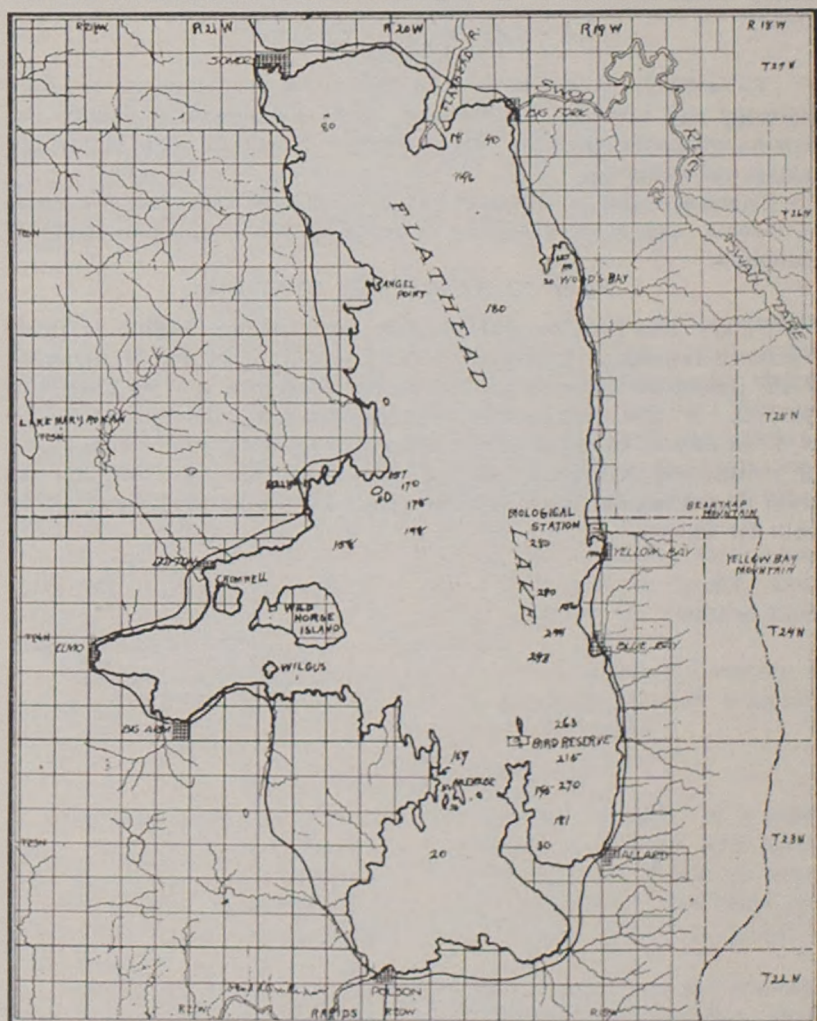
## COLLECTIONS

To assist the botanical work of the station an herbarium has been collected and arranged. It includes about 400 species of plants, collected and contributed by Miss Gertrude Norton. The plants are labeled and mounted.

There are also a collection of about 60 bird skins, several cases of insects, and representatives of some of the commoner forms of mammals.

## HOW TO REACH THE STATION

Yellow Bay may be reached over the Northern Pacific or Great Northern railroads. The main line of the G. N. is left at Columbia Falls, thence to Kalispell and Somers, a short run, and by boat from Somers. A new branch has been constructed from Dixon, on the N. P. to Polson, 35 miles. From Polson travel is by boat. At the time of writing the contractor has not turned over the new line, but the train makes regular runs. The best way is to take automobile at Ravalli for Polson.



Sectional Map of Flathead Lake and Surrounding Region. Figures Indicate Depth of Water.



## INVESTIGATION

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During the past years members of the station staff and those attending the station have prepared many papers and bulletins as the result of investigations. Some of these have been printed as University bulletins, some have appeared as bulletins from other institutions, and others have appeared in scientific magazines.

For the coming season the research work of the station staff will be concerned with the large problem of attempting to connect the smaller organisms living in the lake with the food of fishes, with the ultimate idea of relating in some way the number of organisms with the capacity of the lake for fish production. Last season the problem was outlined and much preliminary work accomplished. In 1916 the season was spent in investigations on the food of fishes, the results being ready for publication.

Co-ordinate with the problem before mentioned is the systematic and distributional study of the entomostraca, algae, protozoa, and some other groups.

### BEGINNING RESEARCH

Special investigation and research work may be undertaken by those qualified to work independently. Every encouragement will be given in the direction of profitable research and in the publication of results. Those who need special apparatus should notify the director before coming. The station is not well provided with apparatus and literature, but needs of investigators will be supplied if possible. Investigators may make arrangements for longer period than the regular six weeks of the session.

Students who are beginning research, or who work under direction, are recommended to choose subjects in the following fields:

The morphology, taxonomy and distribution of fresh water algae and of parasitic fungi. Mr. Graff.

The fishes and insects. Mr. Elrod.

The protozoa and entomostraca. Mr. Claycomb.

Prerequisite—Admission by permission of the instructor in charge. This course gives full credit to graduates.

### ADVANCED RESEARCH

Those students prepared to undertake investigations with self-devised plans and methods will find the following fields fruitful:

In morphology there is abundant material of many forms. Many species almost or entirely unknown to science are to be had.

In taxonomy many groups are yet in confusion, both land and water species. Insects, worms, crustacea, algae, fungi, and flowering plants present many opportunities for the investigator. Much important study is delayed by the inadequate taxonomy.

In parasites the field is almost untouched.

In embryology the season is just right for some fishes, and for the entomostraca. In other groups it probably is good.

In ecology there are many habitats for study. The field is good. Varying geological formations and climatic areas give wide range for work.

In cytology there is good material, but special attention must be given in advance to equipment for slide preparation.

In geographical distribution for most of the species only a beginning has been made. The field is large.

In bacteriology the field is open, but facilities at the station are lacking.

## COURSES OF STUDY

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**Systematic Botany**—Plant analysis and field ecology. The classification and distribution of the flowering plants, with special reference to the plants of the region, will be the main work. Attention will be given to plant associations. Most of the trees and shrubs of the northwest region are found close to the station. Prerequisite, elementary botany. Mr. Graff.

**Systematic Mycology; Morphology, Ecology and Taxonomy**—The study of the forms of the region, including those found in the main lake, in ponds, and in the streams will be undertaken in this course. The algae are as yet largely undetermined, and there is opportunity for some excellent results. Prerequisite, elementary botany. Mr. Graff.

**Invertebrate Morphology**—A study of types and of groups of animals of the locality. This will include protozoa, sponges, hydra, molluscs, worms and insects. Each student will be expected to pay particular attention to some special group. Prerequisite, elementary zoology. Mr. Claycomb.

**Animal Ecology**—A study of the conditions of life in the lake and ponds, the number and distribution of lake animals, their habits and habitats, their reactions to stimuli under normal and artificial conditions. Prerequisite, elementary zoology. Mr. Elrod.

**Entomology**—A course dealing with insects, particularly with those of the region. Water insects and their utility will be an important feature; next to this will be the insects of the forest. Prerequisite, an elementary course in botany or zoology. Mr. Elrod.

**Land Animals**—This course will have special reference to the animal communities of the ponds, prairies and forests, dealing particularly with vertebrates. The localities for study include the lake





Location of the Station at Yellow Bay. The Illustration Shows Proximity of Water, Forests and Mountains.  
This Picture Taken from the Automobile Road and the View Is North.

shore, the prairies, the orchards, the deep woods, the open ponds, the swamps, the mountain ridges, the talus slopes, and the high summits. Prerequisite, an elementary course in zoology. Mr. Claycomb.

Not all of the above courses will be given. The selection will depend on the choice of those attending. If fewer than three persons apply for a course the privilege of not giving the course is reserved.

Students are urged to concentrate their efforts and to register for not more than two courses.

### LECTURES

A series of lectures will be given by the station staff, dealing with the geological history of the region, the origin of the lake, various phases of animal and vegetable life as it exists near the station, effects of altitude upon life, and various evolutionary problems. These will quite likely be given in the evening, and will be regulated by circumstances.

The following subjects for lectures are given:

The Origin and Development of Flathead Lake.

Seasonal Variations in Flathead Lake.

The Effects of Altitude Upon Life.

The Fishes of Montana.

The Value and Purpose of Ecological Study.

Problems for Investigation at Yellow Bay.

The Conditions of Existence (Shelford), a Review.

Methods of Biological Investigation.

The Biology of the Middle Mississippi River Region.

Animal Communities of the Yellow Bay Region.

The Plankton of Flathead Lake.

Biology in the High School.

Forest Tree Diseases of the Flathead Lake Region.

Jewels of the Plant World (Diatoms).

The Lichens and Their Relation to Other Thallophytes.

The Ferns of Western Montana.

Plant Collecting in the Tropics.

The Collection and Preparation of Plants for Study.

### PREPARATION FOR TEACHING

The courses offered give special preparation for teaching either Botany or Zoology in secondary schools or colleges. The work as outlined and planned consists largely of field work, dealing with the animals and plants of the locality. By this plan actual training in field courses is given, fitting the methods of advanced biological teaching as used at the present time.



# INFORMATION

## REGISTRATION

As the number to be accommodated is limited, early registration is very much to be desired. From many years of experience it has been shown that it is wise to register for not more than two courses. The time is short to give to even one course and it is far better to concentrate on limited lines of work. Advanced students will find it profitable to begin some line of investigation in a field in which they are interested or are carrying a course.

## UNIVERSITY CREDIT

Students giving full time for the six weeks may earn 9 quarter credit hours. The time for work and the amount of credit is not specified for particular courses as these will depend upon the desire of those enrolling for the subjects.

## EXPENSES

Students will pay the regular summer session registration fee of \$10.00 for the six weeks. A camp fee of \$5.00 is charged for scientific equipment and for the boats. The charge for tent is \$5.00 for the session, or for longer if desired, on the basis of two in a tent.



The Beach at Low Water.

For one person for six weeks the expense is about as follows:

Matriculation fee .....	\$10.00
Camp fee .....	5.00
Tent .....	5.00
Board .....	36.00
Incidentals (estimated) .....	8.00
Total .....	\$64.00

#### REFUND OF TRANSPORTATION

The station is an integral part of the University of Montana. The outline of work and the granting of credit is governed by University regulations. Students attending the station and who live in Montana will have refunded to them the amount of railroad fare less \$5.00. This is in accordance with a law passed by the state legislature. However, the following conditions must be met: In every case of payment for transportation a receipt must be taken. This receipt must not include the war tax. In no instance will any war tax be refunded. These receipts must be submitted before refund can be made. This refund is made only to those who complete satisfactorily the work for which they register.

#### LIVING CONDITIONS

Since the station is far removed from town or city it is necessary to provide living conditions in accordance with the environmental requirements. There are neither rooming places nor boarding places except as provided by the station. All precautions have been taken to maintain reasonable comfort and to promote health. The station has its own water supply. Pure and cold water is piped from a large spring on the grounds, giving an abundant supply to the laboratory building and to the kitchen and dining room.

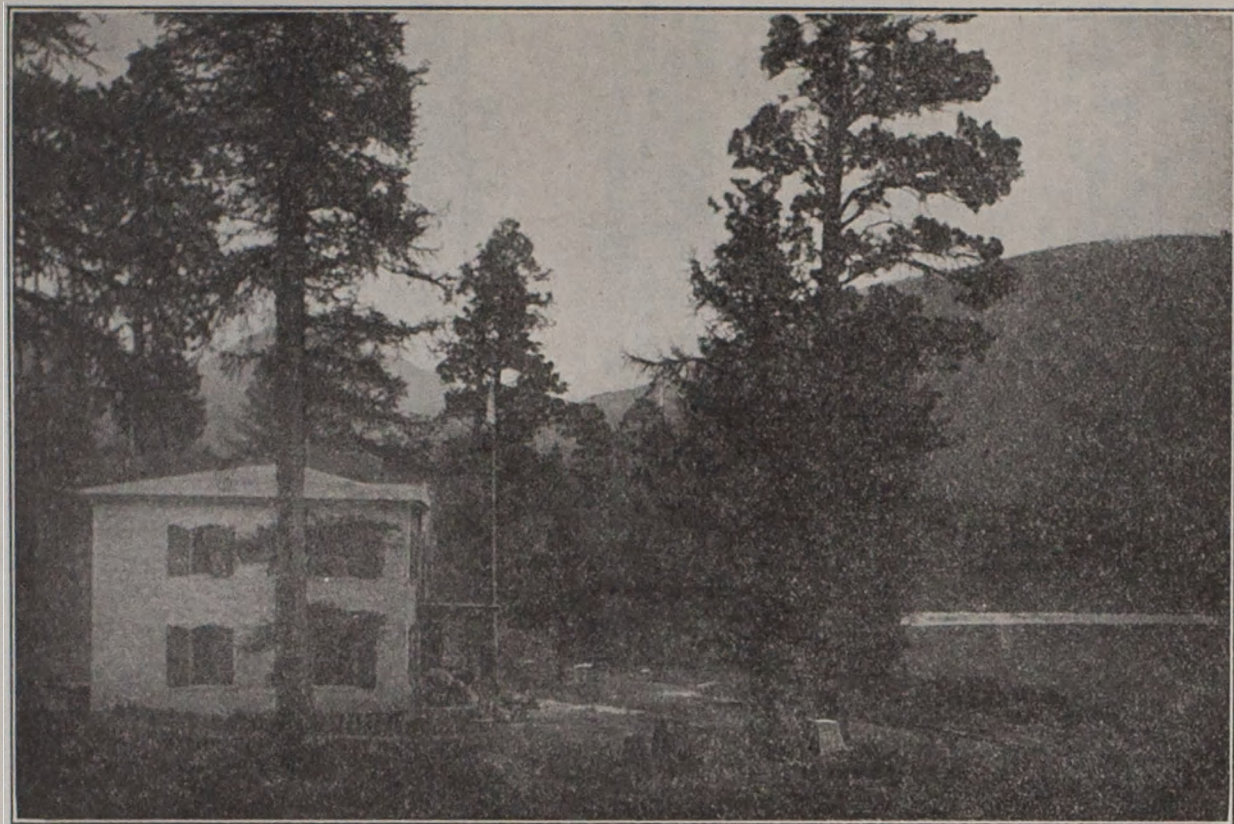
#### Board and Lodging.

Those attending the station are provided with tents. Each tent is of heavy material, with four and a half foot wall. The size is 11x14 feet. Each tent is provided with board floor, a wooden bedstead, a tick filled with hay or straw, a stand, a stool, a mosquito cover, and necessary utensils. It is expected that two persons will occupy a tent. Each person must provide the necessary bed clothes, pillows and towels.

Students may supply their own tents and thus save expense, although the rental for tents has been reduced to the lowest possible amount.

Meals at the station are furnished at cost. In past years the price has been \$6.00 per week. Members of the station are not permitted to cook their own meals. Students will be expected to pay in





The Station Building and Environment.



advance the cost of meals for the session. For those who do not stay the full time an excess must be charged.

#### The Weather.

June is the rainy season for the region. After the Fourth of July the climate is likely to be summer sunshine for most of the time. The high water of the lake comes about June 15, when the water is from 10 to 15 feet above the normal stage. It slowly recedes, perhaps an inch a day, reaching low stage about September 1. The nights are always cool, the temperature falling at night to 45 or 50 degrees Fahrenheit. Plenty of warm clothing is necessary.

#### LIFE AT THE STATION

This varies with the individual. Half day work periods are employed, one subject in the forenoon, another in the afternoon, in case two subjects are taken. Work closes about 5 in the afternoon. Saturdays are usually devoted to scientific trips.

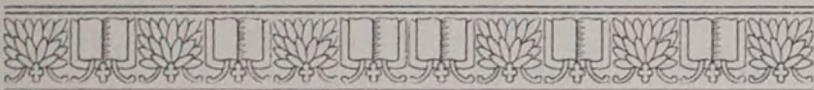
#### Recreation.

Boating, swimming, fishing, walking or climbing may be indulged in after the day's work is over. There is abundance of wood and evening bonfires are a very popular diversion after the day's work. Saturdays are usually taken for all day collection trips, when work and recreation are combined.



A Collecting Party.





# *The Summer Quarter*

OF THE

## *STATE UNIVERSITY*

JUNE 17-AUG. 30

WILL EMPHASIZE THIS YEAR

### *Courses Dealing With the War*

Special lectures will be given on "The Nations of the War," "The History of the War," "Personal Service in Wartime," "The Teacher and the War." Special courses will be offered in: First Aid, Scoutmasters' Work, Military Physics, Food and the War, Conservation of Food, Conservation of Energy, Conservation of Resources, Conservation of Man Power.

### *A Course in War Intelligence*

will place before the teacher the very material which is needed to meet the special responsibility and the definite duty which war conditions have placed upon the school.

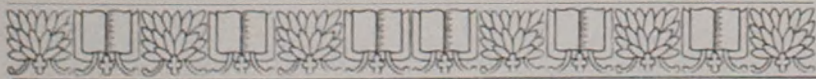
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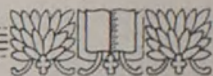
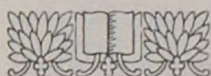
Write for the Summer-Quarter Bulletin.

State University of Montana  
MISSOULA, MONTANA

EDWARD O. SISSON,  
President.

JESSE P. ROWE,  
Director, Summer Quarter.





# THE STATE UNIVERSITY OF MONTANA

Offers an opportunity for every Montanan to equip himself for effective public service in the war. Governor Stewart, Chancellor Elliott, Hon. E. C. Day, President E. O. Sisson of Montana, President Lindley of the University of Idaho and other speakers of recognized ability will lecture during

## *War Speakers' Week*

*June 24-29, 1918*

Upon topics connected with the war and the war work at home. There will be also five days of thorough, practical drill in

## *Public Speaking*

This is a training camp for the army at home. The University Summer Quarter (June 17 to August 30) offers special war and teachers' courses.

Write for particulars.

THE PRESIDENT,  
State University, Missoula, Montana.

