INSTITUTE OF PHYSIOLOGY (HALLERIANUM) UNIVERSITY OF BERN

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The Institute of Physiology of the University of Bern was built in the years 1892 to 1894 from the plans of Professor Dr. Hugo Kronecker and Stempkowski, canton architect. The cost of the building amounted to 287,000 francs. The Institute was given the name "Hallerianum" in honor of the great physiologist of Bern, Albrecht von Haller.

The building plans and organization of the Institute were formed with the idea that the Institute should be devoted to the general field of physiology. Professor Kronecker, who was a pupil of Carl Ludwig, organized physiology in the Institute according to the ideas of his great master and he also made the interior arrangements conform to this idea. His successor, the present director Dr. Leon Asher, also a pupil of Ludwig's, tried to preserve this tradition when he took over the directorship of the Institute in 1914 and superintended the addition of modern equipment.

The Hallerianum (Fig. 1) is a brick building arranged in three divisions. Sandstone was used for the window and door-frames, as well as for the pillars in the large vestibule on the ground floor. Granite was used for the

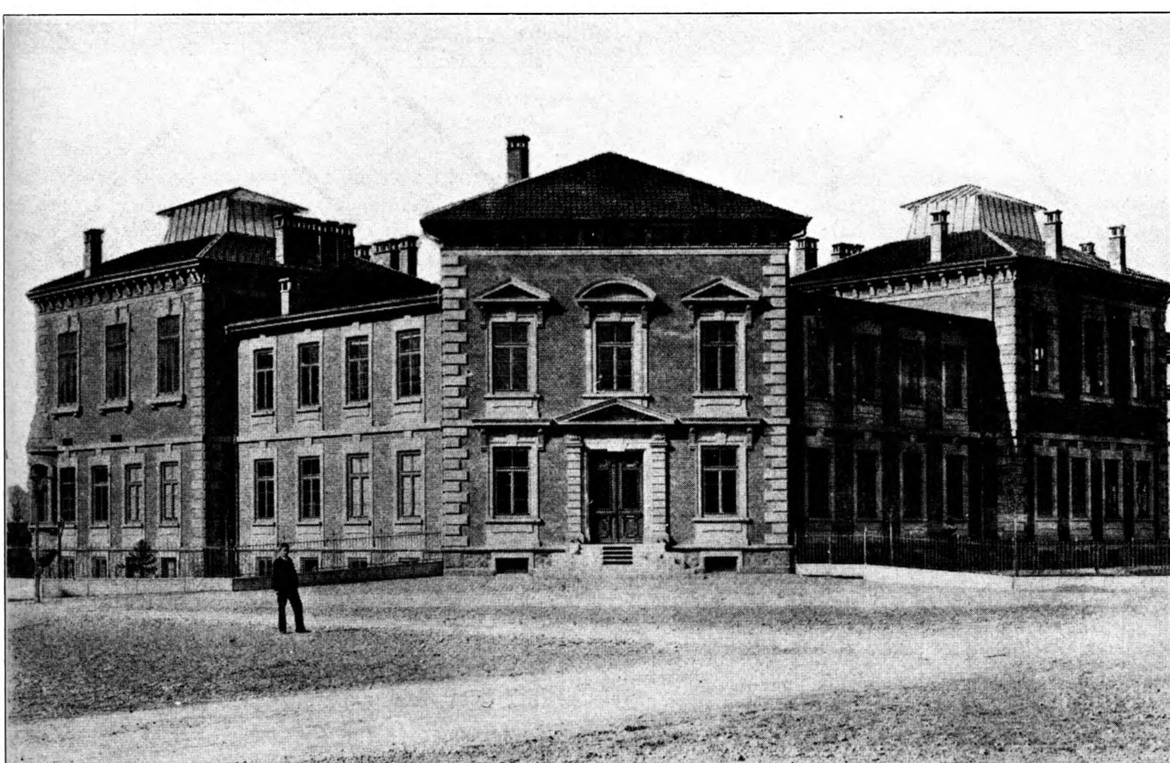
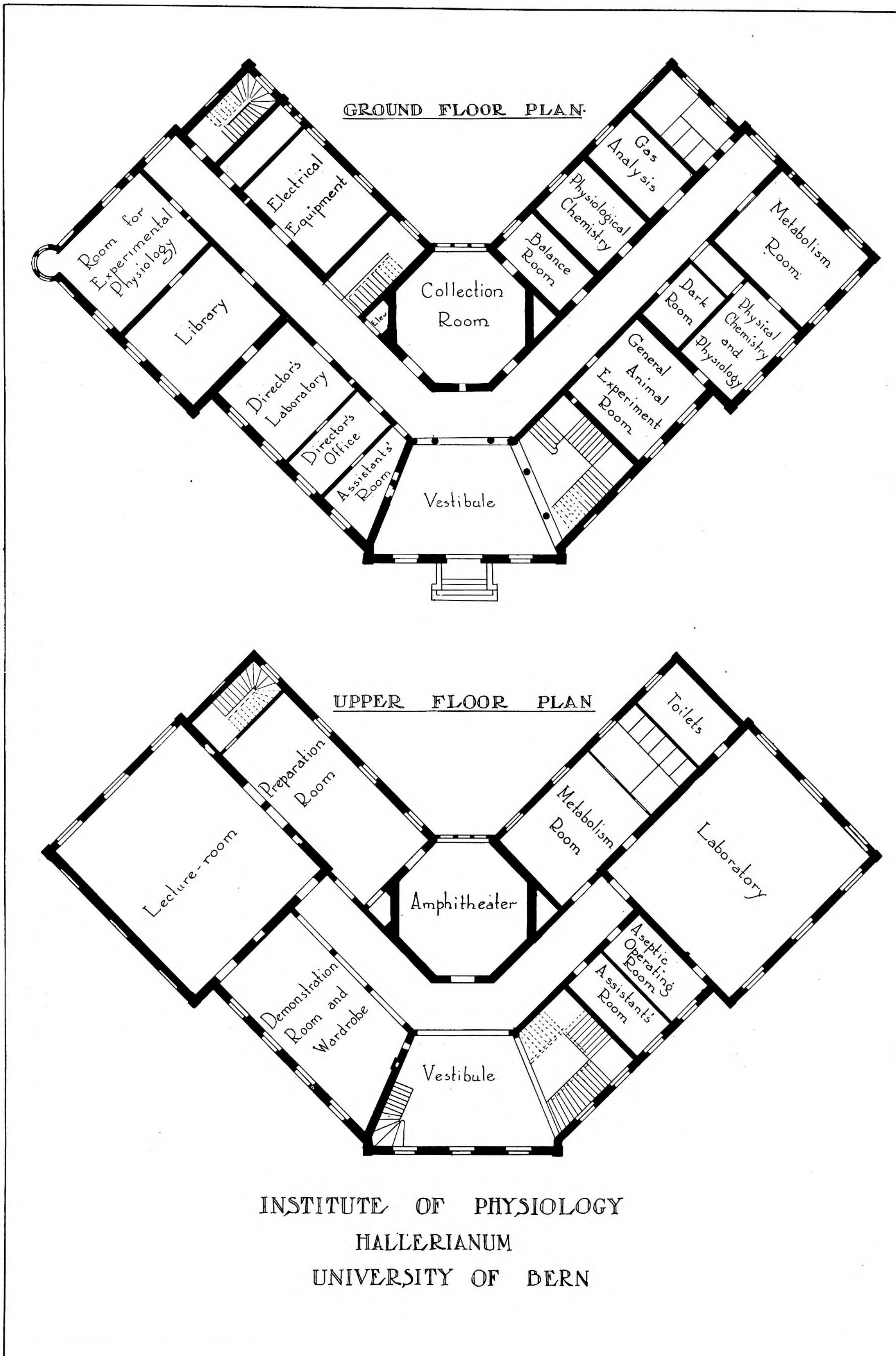


FIG. 1.—INSTITUTE OF PHYSIOLOGY (HALLERIANUM)


GROUND FLOOR PLAN
Room for Experimental Physiology
Electrical Equipment
Library
Director's Laboratory
Director's Office
Assistants' Room
Elev.
Collection Room
Vestibule
Balance Room
Physiological Chemistry
Gas Analysis
Metabolism Room
Dark Room
Physical Chemistry and Physiology
General Animal Experiment Room
UPPER FLOOR PLAN
Preparation Room
Lecture-room
Demonstration Room and Wardrobe
Amphitheater
Vestibule
Metabolism Room
Toilets
Laboratory
Aseptic Operating Room
Assistant's Room
INSTITUTE OF PHYSIOLOGY
HALLERIANUM
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FIGS. 2 AND 3

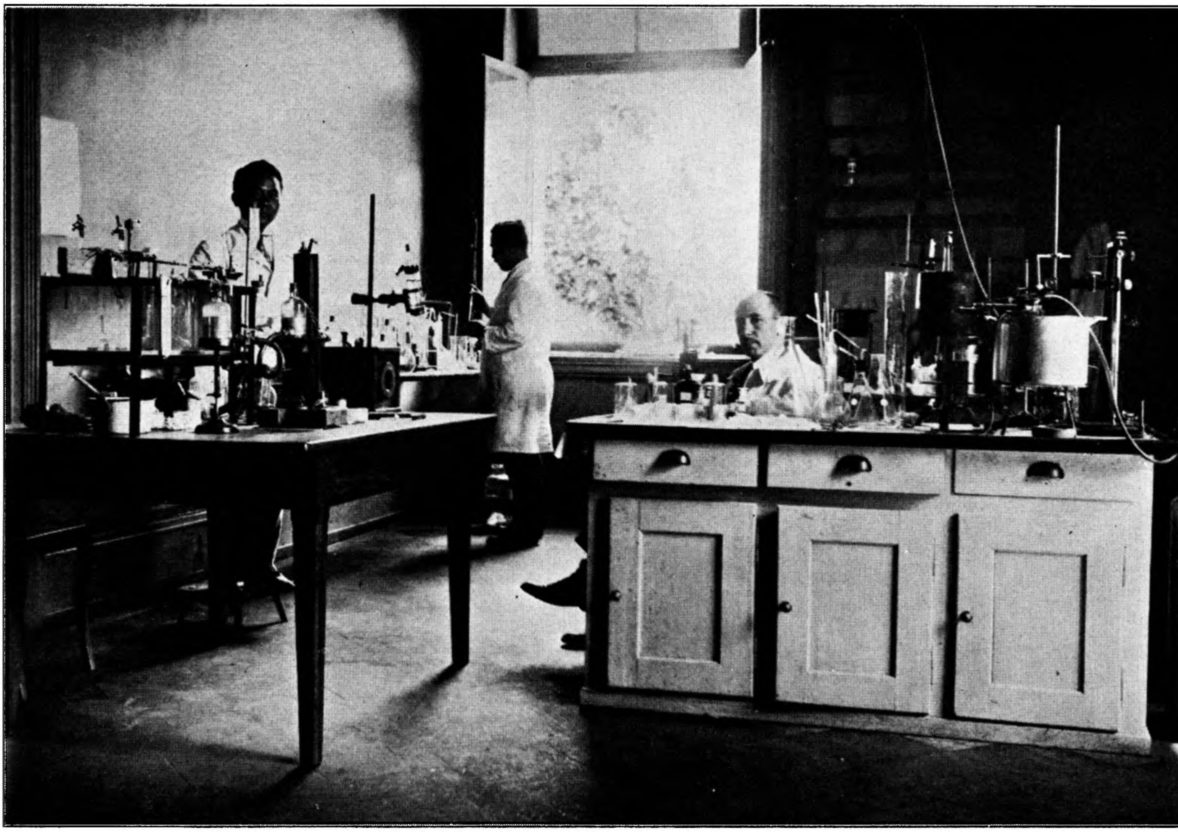

FIG. 4.—WORKROOM AND RESEARCH ROOM

stairs. All the rooms have oak parquet floors, while the floors in the halls and corridors have been covered with cement blocks. The house is provided with low-pressure steam heat; the temperature can be regulated in every room by means of radiators.

The Institute consists of three floors—basement, ground floor, and upper floor. In general the ground floor is used for research work, the upper floor for instruction, although the dividing line is not very strictly drawn since rooms have been equipped for research work on the upper floor as well. The basement has rooms for the Institute attendants, the workshop, the machine room with electrical equipment, frog cellar, wash kitchen, string galvanometer room, calorimeter room, and others for special purposes.

ELECTRIC SUPPLY OF THE INSTITUTE

The municipal alternating current is used to illuminate the Institute. During 1914–1915 a motor-dynamo and battery fixture were built in the machine room of the Institute according to the plans drawn up by Professor Asher and by the power company of Bern, and in several rooms wiring for the various kinds of current was installed. In the machine room there is a motor-dynamo group, consisting of a seven-horsepower rotatory current motor coupled with a direct current dynamo. The direct current dynamo charges first, a 120-volt storage battery; second, a 10-volt storage battery; and third, a separate 28-volt storage battery for the magnetic field of the string galvanometer. Together with the motor-dynamo group there is a large switchboard with two separate divisions, one for the large and the other for the small battery. Besides the usual fittings each switchboard is provided with two specially constructed automatic keys which open of themselves if there is too strong a current or too great tension thus protecting the storage battery as well as the dynamo from harm. The storage batteries are kept separately in an adjoining room. There are inlets to the various work and instruction rooms. In these there are switchboards with conductors, from which either 10- or 120-volt direct current, or 125- or 250-volt alternating current can be derived. The alternating current is supplied from the town into the building through a separate conduit. In the laboratory where practical courses are given there is a 10-volt direct current switch so that

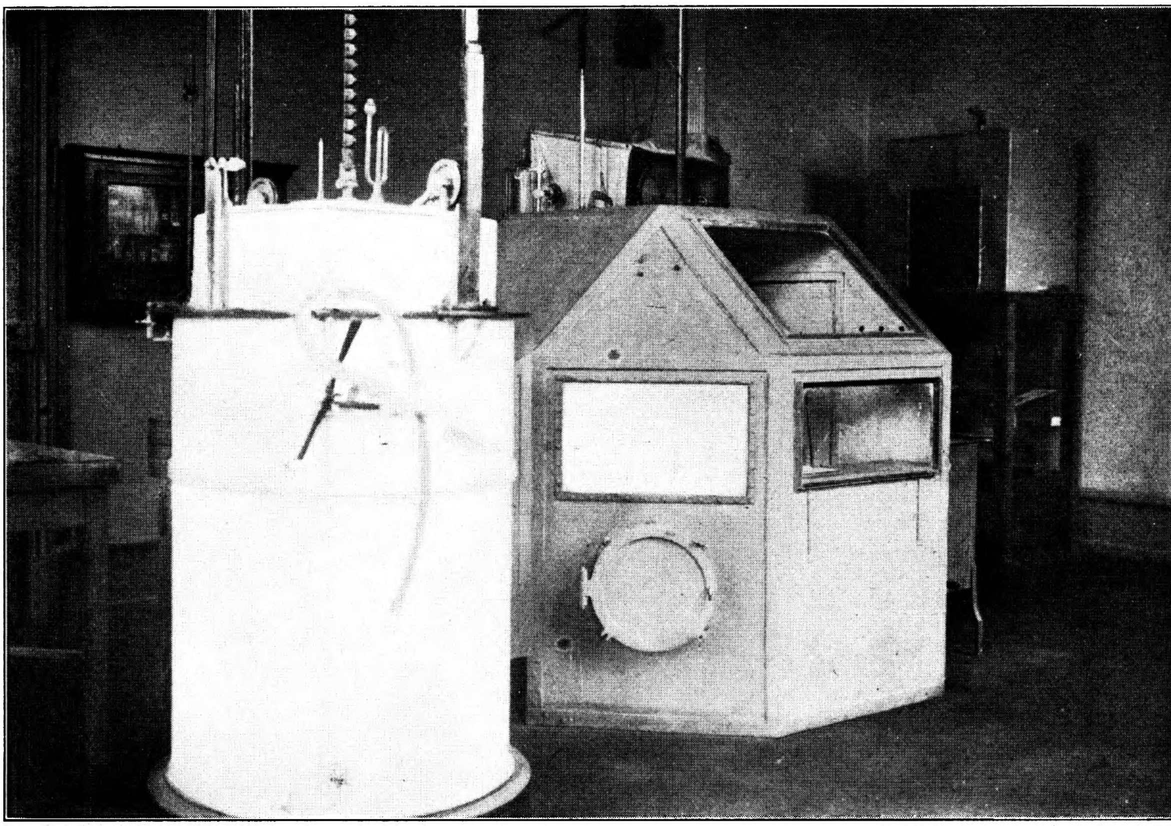

Fig. 5.—Respiration Apparatus and Metabolism Room

from their places the students can turn on the current for the lead wires of the induction apparatus. With a double polar key the alternating current can be shut off from the part in which the string galvanometer is found.

GROUND FLOOR

The general arrangement of the rooms on the ground floor is shown in Figure 2. On the left of the vestibule there is an assistant's room; the director's office; the director's private laboratory with equipment for experimental work, provided with a large movable kymograph, sensitive thread galvanometer of Hartmann and Braun, chemical work table, colorimeter, nephelometer, and various other apparatus; the library; and also a workroom for vegetative physiology and for related experimental physiological researches. Figure 4 gives a picture of a workroom, showing the characteristic features of the Institute's special rooms for individual research workers. One work table is equipped with apparatus for micro-gas analysis and tonometric determinations. The other table is fitted out for the examination of the organs of mammals. In the background there is a third chemical work table.

On the same side of the ground floor there is also a so-called electric room used for the more delicate biophysical examinations. These rooms as well as those before mentioned can be completely darkened for taking photographs. On a glass plate inserted in the masonry there is a very sensitive Du Bois and Rubens galvanometer. Three meters away on another glass plate attached to the wall is a magnified scale. The scale is made of glass and is lighted from both sides by Auer lamps. This means of illumination dispenses with the complete darkening of the room. Opposite the vestibule there is a collection of apparatus in closed dust-proof glass cases. In the other wing of the ground floor is the balance room, the room for physicochemical work, a room for gas analysis in which an automatic mercurial air-pump (Raps-Kossel) and some gas analysis apparatus have been placed. In this room the floor is of cement inclined towards the middle so that any escaping mercury can be caught in a small depression. In this wing there is also the metabolism room of the Institute, a room for physicochemical and sensory physiological examinations, a dark room with double doors opening on to the corridor and double (red and orange) windows looking into the

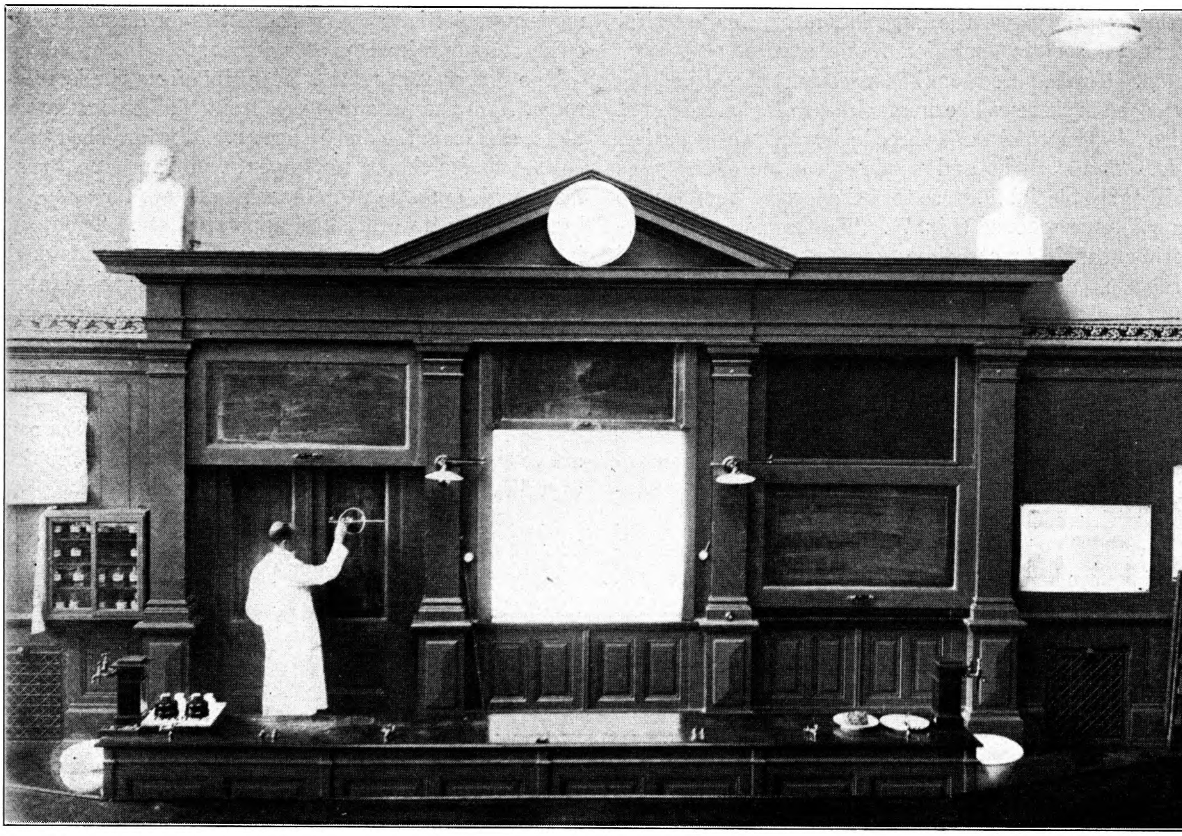

FIG. 6.—VIEW OF BLACKBOARDS AND ANIMAL EXPERIMENT TABLES OF THE LECTURE-ROOMS

physicochemical room, and a large room for general experimental purposes. The dark room contains a large polarization apparatus. Figure 5 shows a part of the room for metabolism examinations.

In the foreground is a large Tissot respiration spirometer. It holds 250 liters and has been exactly gauged with the standard apparatus in the federal office for weights and measures. The equilibration of the movable bell is achieved through metal plugs attached to the guiding band whose weights correspond to any increase in weight by the bell coming up out of the water. The movable bell is separated from the water content of the spirometer by a partition to prevent the absorption of carbonic acid from the water. The regulation of the movable bell is so well worked out, that a pressure of 1 mm of water, which is indicated on the manometer attached above, is sufficient to raise the bell. Because of its large size this respiration apparatus can also be used for the examination of respiratory metabolism in research on muscle. Next to this respiration apparatus is a large Jaquet respiration room in which a person can sit or lie down for extensive tests. Air for ventilation is conducted into this room from the outside. Adjoining the Jaquet respiration apparatus is a respiration room for dogs and rabbits. In addition a Grafe head box for persons sitting down has been fixed against the wall. In the background is a gas meter motivated by an electromotor and the air is ventilated by the three last-named apparatus. In the same room, though not included in the picture, is a Haldane gas analysis apparatus, a Kronecker apparatus for artificial breathing, as well as two work places suitable for animal physiology experiments. The physicochemical and sensory physiological room contains the equipment to determine conductibility, hydrogen-ion concentration, as well as apparatus for spectrum color mixing. In the large general experiment room there is equipment for respiration and metabolism tests with rats and guinea-pigs as well as work places for various researches on animal physiology.

UPPER FLOOR

The upper floor comprises a large demonstration room with cloakroom for the students, the lecture-room, the preparation room for lectures, the amphitheater, a large room for metabolism research and chemical work with a toilet adjoining, a collection room for apparatus for treatment purposes, the large laboratory for practical work, an aseptic operation room, and an assistant's room. The lecture-room has a seating capacity of 105 arranged in six rows like an amphitheater. It is lighted with a large skylight and three high windows on the left side. The skylight and windows can be closed with light-proof black blinds, so that the lecture-room can be completely darkened (Fig. 7). The narrow animal experiment table 4 meters long is provided with water and drainage, gas, compressed and rarefied air, connection for the artificial respiration apparatus, and a switchboard which supplies 120-volt direct current, 125 to 250-volt alternating current, and 10-volt direct current. Next to the middle panel, a sliding panel shuts off a chemical hood with outlet. On the other side a double door provided with blackboards leads into the preparation room; the bare wall next to the blackboard is paneled with wood so that charts can be easily hung up. The center black panel is detachable and discloses an almost square heavy glass panel about 125 cm long. On to this, pictures can be projected from the preparation room by means of a Kohlrausch projection apparatus of Schmidt and Haensch. In the lecture-room itself is a modern projection apparatus of Leitz for diascopic and epidiascopic projections on a screen.

The preparation room is accessible from the lecture-room, from the private stairs, from the demonstration room, and from the amphitheater. It is furnished with cupboards for charts, instruments, preparations, apparatus with operation tables, with bellows for artificial breathing, with warm water apparatus, etc. The room is used not only for the preparations of lecture material but also for animal experiment research work on large animals on circulation, breathing, and nervous system.

In the amphitheater is a circle 3 meters in diameter, separated from the spectators by iron railings (Fig. 7). The spectators stand on six concentric circular platforms, 0.5 meters wide, arranged so steeply one above the other that those standing above can see the experimental table over the heads of those standing below. A large skylight and bright side lights illuminate the room. At night this room as well as the other instruction rooms is lighted by large overhead lamps with indirect electric light.

The large laboratory, situated in the other wing of the upper floor, is very well lighted by means of six high side

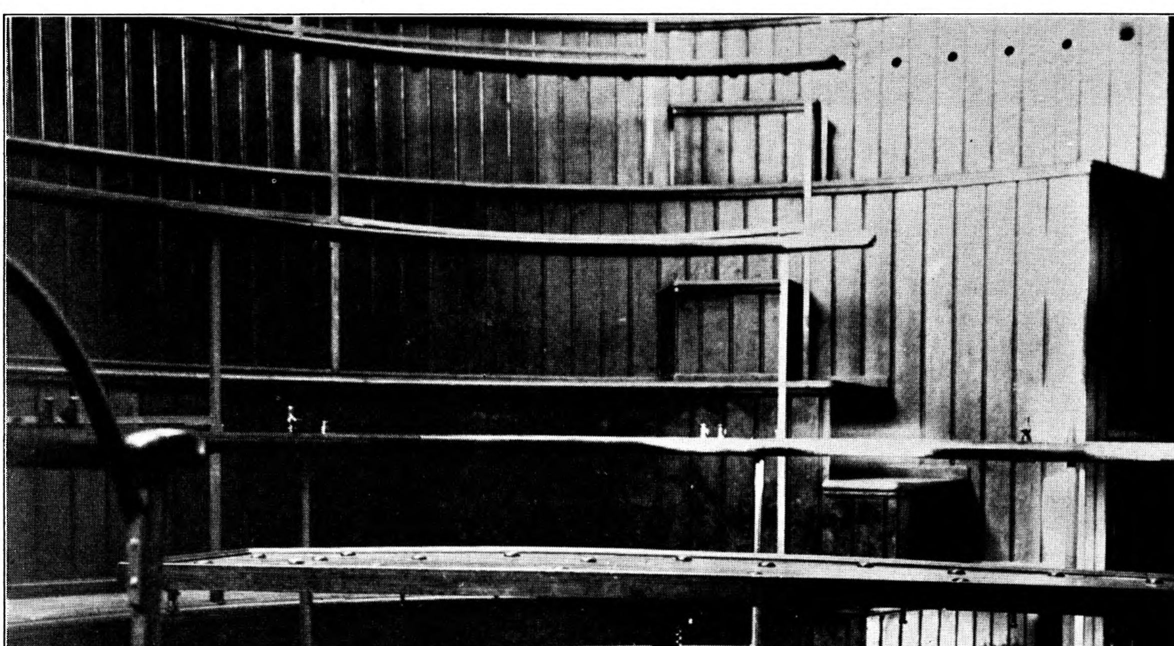

FIG. 7.—AMPHITHEATER WITH REVOLVING DEMONSTRATION TABLE

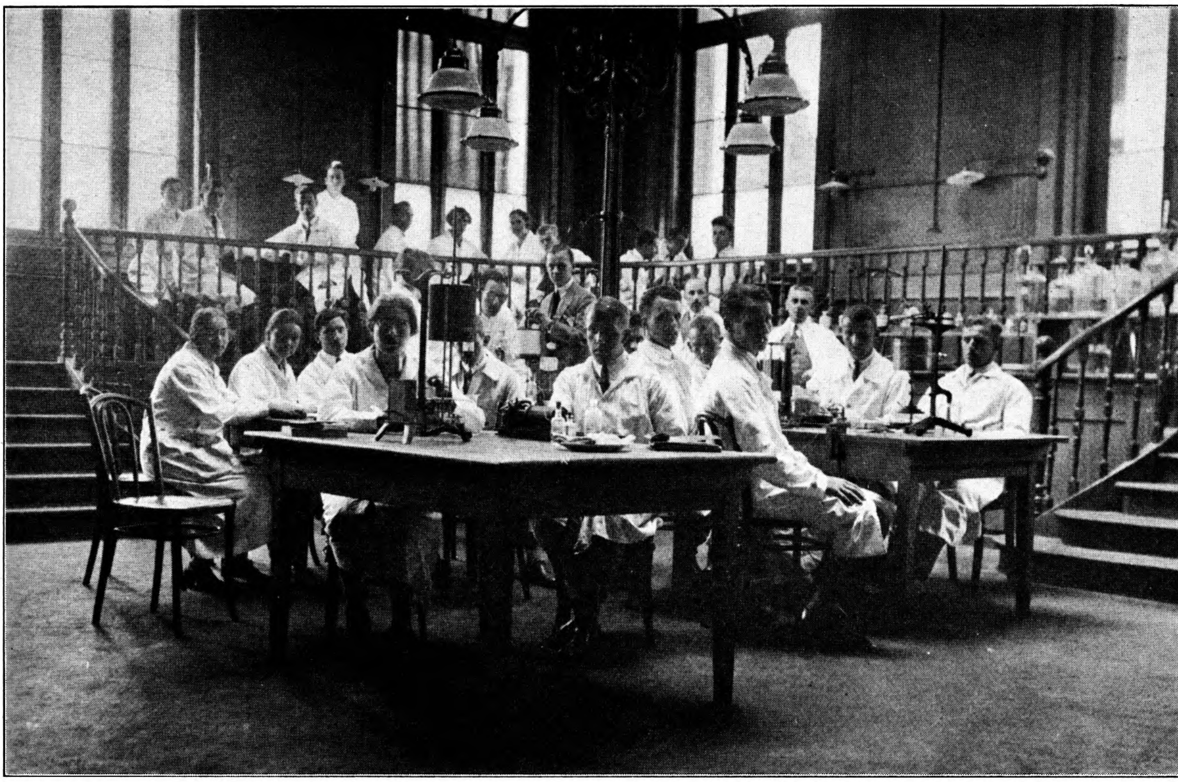

FIG. 8.—LARGE STUDENTS' LABORATORY

windows and a large skylight. In the evening the illumination is provided by a palm-shaped center chandelier with large electric burners in the middle and four hanging electric head lights on 1-meter projecting branches.

Under the windows on the northeast and northwest walls a wooden platform, 2 meters wide is so arranged that the students can carry out the more intricate work standing at the six tables under the six windows. At night daylight is superseded by double electric incandescent burners on the window posts. Electric switches at each table enable the students to make use of the 10-volt battery current, and there is also other electrical wiring for a chronometer which provides for time registration during graphic tests. In the laboratory, besides the large tables for experimental physiological exercises there are also three large chemical work tables with appropriate equipment for biochemical work, a large chemical board with water and gas, artificial breathing apparatus, warm water apparatus, basins, and a frog box complete the equipment. In the corridor opposite the laboratory there is a large cupboard with separate divisions that can be locked and in which the students can keep their instruments.

The aseptic operation room contains autoclaves, apparatus for the sterilization of instruments, apparatus for the provision of sterile distilled water, an operating table, instrument cupboard, and wash-basin for the sterilization of the hands. The preparation of animals takes place in the above mentioned room for chemical work situated opposite. By means of a small stairway one can go from the upper vestibule to the flat roofs of the connecting buildings.

BASEMENT

The room in the basement for the string galvanometer deserves particular mention. The string galvanometer equipment shown in Figures 9 and 10, was made by the firm of Stoppani and Co., Bern, in cooperation with Dr. George Edmonton Fahr, now in Minneapolis, Minnesota. The string galvanometer room contains a string galvanometer, Morin's apparatus, time-registration apparatus, compensation and gauging apparatus, and switchboard.

The string galvanometer stands on a cement slab sunk deep into the ground and separated from the surrounding floor by a layer of sand. The galvanometer is made after the Einthoven model, the ammeter and the iron magnet of the electrode are so large that the power in the outlet, which is only 1.5 mm, is 32,000 gauss. A

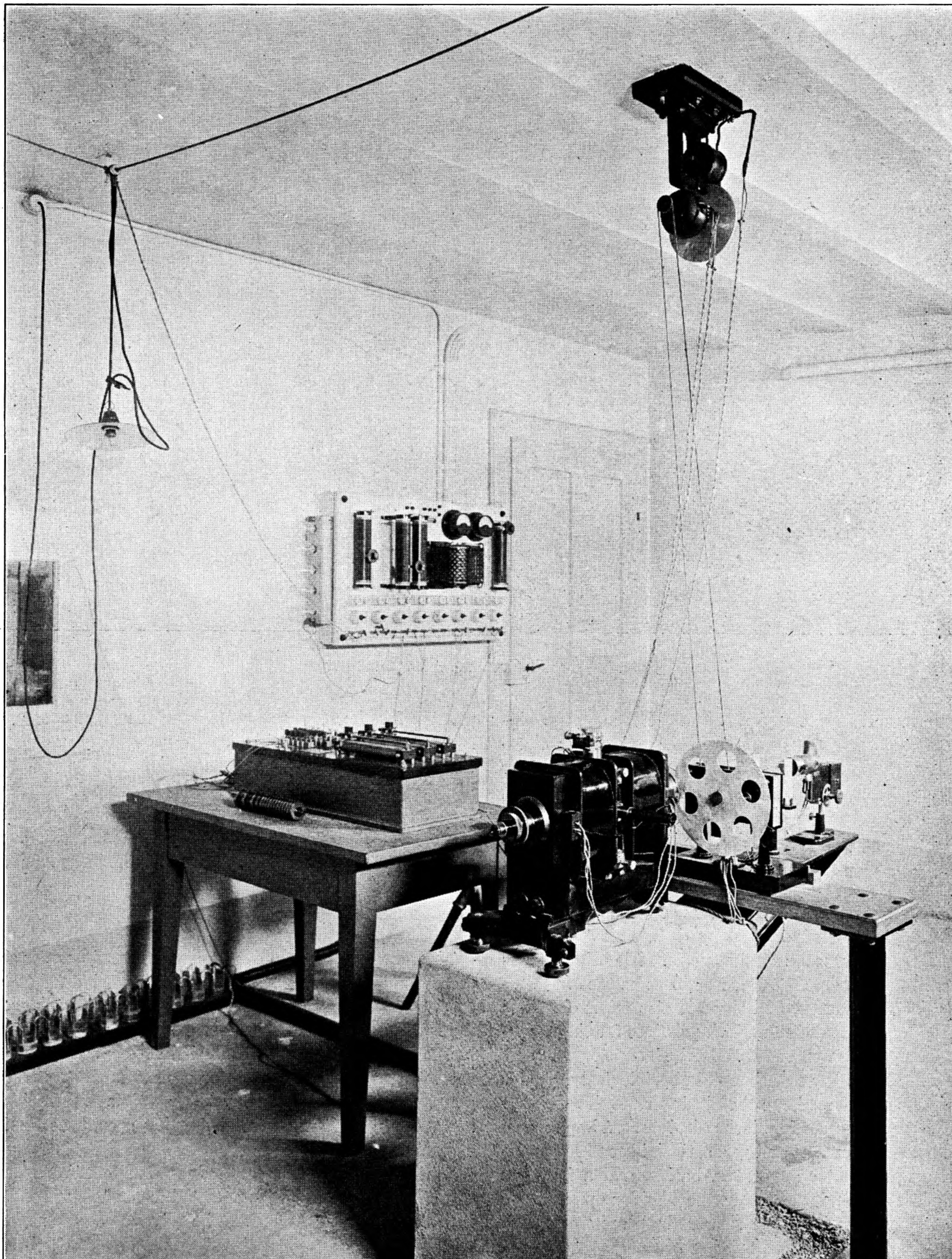

Fig. 9.—String Galvanometer Room with Time-registration Apparatus, Compensation and Gauging Apparatus and Switchboard

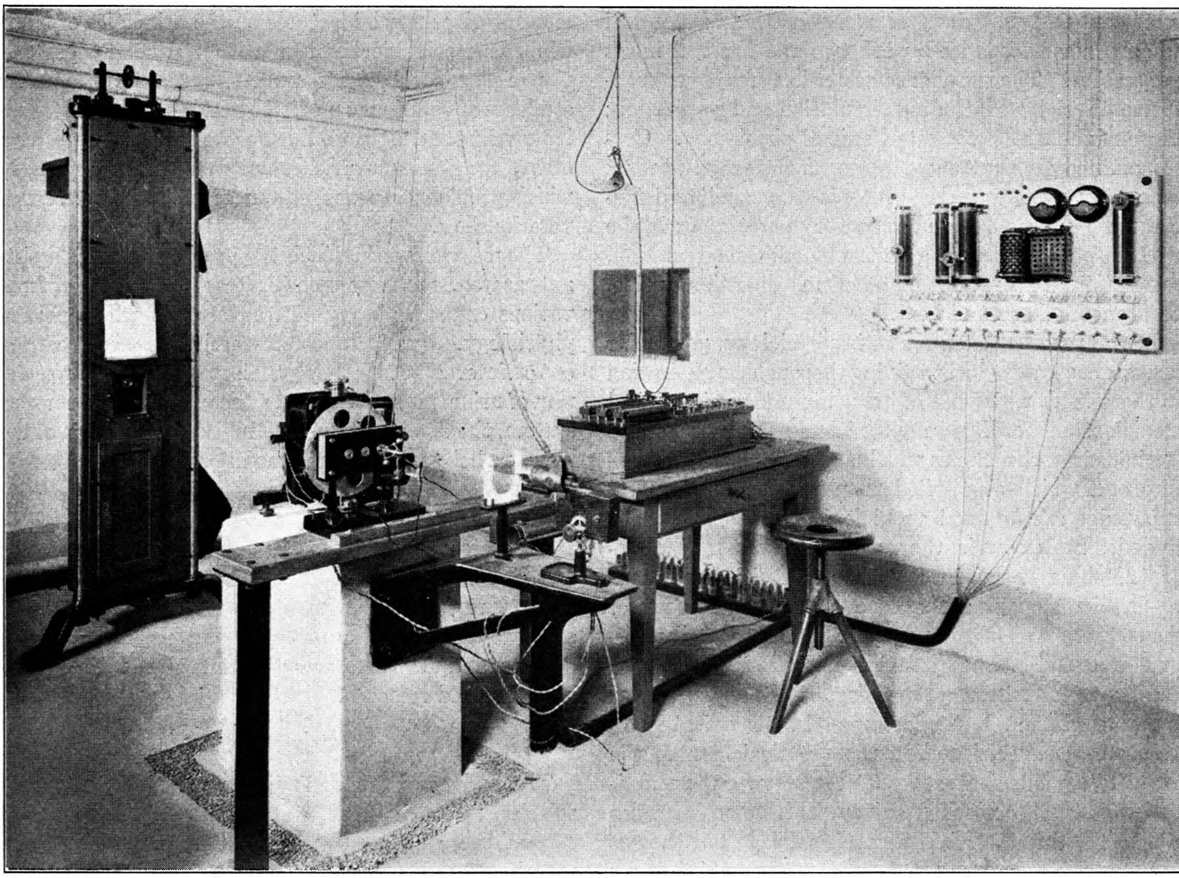

FIG. 10.—STRING GALVANOMETER ROOM WITH MORIN'S APPARATUS, TIME-REGISTRATION APPARATUS, COMPENSATION AND GAUGING APPARATUS, AND SWITCHBOARD

Zeiss optical apparatus is used for the projection of the strings on a plate camera. The first projection eyepiece enlarges either 1,000 or 2,000 times. On one side of the string galvanometer, a Wertheim-Salomonson microscope has been placed which serves for the observation of the strings in more delicate work. A 10-ampere arc lamp provides light for the projection of the strings. The 2-meter high plate camera is held in place by two iron bars and rests on a heavy iron base. It is enclosed on all sides by oak panels. The cassettes hold plates 40 cm long by 10 cm wide. The cassette can be closed and opened from the outside by light-proof sacks. The cassette carrier can be wound up with the help of an apparatus attached to a board fastened to the wall above. The apparatus, in addition, consists of an electromagnet with Foucault damper. The control can be released electromagnetically. The velocity of fall can be considerably regulated with the help of the Foucault damper. The maximum velocity of fall, if the plates have passed the opening, is 1½ meters per second. This can be decreased to a few millimeters by control. A regulation resistance on the switchboard serves to regulate the current which controls the damper. In the opening there is a cylinder lens with a Zeiss attachment. The compensation and gauging apparatus on a nearby table, with shunt, key, and commutator provides, by means of three regulation resistances, very gradual compensation and gauging by means of the millivolt. For time registration a Garten spiked wheel is used whose finer regulation is provided through the damper of the many regulation resistances and a centrifugal regulator of the electromotor attached to the ceiling. The ammeters of the string galvanometers receive their current through a 28-volt storage battery used only for this purpose. The current is very slowly sent through by means of a sliding coil.

Heated animal cages are to be found in the garden of the Institute.

TEACHING

The physiology instruction in the Hallerianum is given in six lectures a week in the winter and summer semester, and in practical work in the winter and summer semester twice a week two and one-half hours per session. The summer semester lectures cover vegetative physiology including circulation and respiration; those of the winter semester, animal physiology. Correspondingly in the summer semester the practical work includes work on muscles, protoplasm, general and special nerve physiology and of sensory perception; in the winter semester, teaching on the blood, the circulation, respiration, respiratory metabolism, digestion, urine, basal metabolism, and heat.

In the practical instruction in physiology, particular importance is attached to giving thorough consideration to those fields which are of great importance in clinical medicine. Accordingly in physiological practise all the methods in use in clinics which are physiological by nature and which as applied to physical and chemical knowledge are founded on biological problems are included. For example, the work carried out by the students includes dynamics of the heart, respiratory metabolism, microanalysis of the blood, exact measurements of the sensitiveness of the nerves of man, practical problems on examinations by means of the ophthalmoscope and laryngeal mirror. Physiological chemistry proper is not taught but in the lectures all biochemical problems are considered and in the practical courses the quantitative chemical methods necessary for the examination of the functions are given. Pharmacology also is not taught in the Institute of Physiology but the use of pharmacological material for the analysis of organ functions is likewise made in the practical work.

To complete the instruction given by the professor, a lecturer gives special lectures on the principles of nourishment, special biochemistry with particular consideration of physicochemistry, and on internal secretion. As students of veterinary medicine besides students of medicine visit the Institute, during the summer semester a course for students of veterinary medicine is given, in which problems are worked out of exclusive interest to veterinarians.

The research work, which the professor and his assistants as well as numerous coworkers of the professor from various countries carry out, covers the whole field of physiology. For instance, research has been carried out on internal secretion, physiology of circulation, secretion of urine, muscular fatigue, the autonomous nervous system, the doctrine of permeability, the function of the liver, carbohydrate and fat metabolism, etc.

PERSONNEL OF THE INSTITUTE

The personnel of the Institute consists of the director (Dr. L. Asher, professor), the first assistant (Dr. I. Abelin, lecturer), the second assistant (Dr. N. Scheinfinkel), and two dieners. The professor and his assistants are doctors, and devote their entire time to the work of instruction and research.

BUDGET

The budget of the Institute for all expenses, except salaries, electricity, gas, water, and light, amounts to 4,200 francs increased by 700 francs for instruction in veterinary medicine. The budget for the salaries of the scientific staff amounts to 20,400 francs and for the dieners about 8,000 francs.

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