the history of the Christian church. For the restoration of the pews, pavement carpets and triumphal crosses, well preserved remnants served as models.

At the present time the chapter hall is being transformed into a magnificent structure in keeping with its important character as the order's highest place of conference, in which elections of the grand masters took place and decisions rendered which affected the peace of the province. As the three ribs on the side of the vault bend down to the octagonal columns and gracefully merge into them, the eye, on beholding these three slender granite supports, likens them to palm trees. Figures on the capitals of the columns represent in symbolical form the vows of the order: Poverty, For-

neuers of 1894. The convention chamber is one of the most delightful portions of the castle, and similar to the chapter hall, its vaults are decorated with the escheons of the nobles. A platform or stage for singers, old German chests and closets, pieces of armor and other embellishments here attract the eye.

In the artistic decoration of the various halls, Dr. Steinbrecht was assisted by an advisory board of artists composed of the sculptors Prof. Behrend, of Berlin, Schöneisener, of Marburg, H. Schmitz, in Cologne; the painters Prof. Schaper, of Hanover, August Grinner, of Berlin (who died in the meanwhile), and glass painter Prof. Haselberger, of Leipsic.

"Der Verein zur Wiederherstellung und Aussch-

castle, grand master's palace, the tower-crowned draw-bridge, the watch towers and the sconces of the citadel, together with the richly ornamented church of St. Mary, with its huge Madonna statue standing in a niche. Even as the knights of the order united the sword with the cross, so the whole structure shows a close connection of the worldly with the spiritual, of life with faith. The building was once a castle, a defense against hostile force, a residence of princes; but it was also a church, with consecrated ground, where, amid the swinging of censers and the chanting of choirs, the knights of old performed their Sabbath devotions. The old castle thus again rises before us—a stone record that tells of the flourishing state on the

GENERAL LABORATORY FOR MICROSCOPY, HISTOLOGY AND EMBRYOLOGY.

bearance, Obedience. The hall is further ornamented by thirteen mediæval stained glass windows. Upon the walls will be hung portraits painted in antique style of the twenty-three grand masters of the order, from Heinrich von Walpot to Ludwig von Erlichshausen, the last master in Marienburg. Richly ornamented and carved benches, gayly colored pavements and other furniture in keeping with the character of the hall will complete the harmonious whole.

The long seven-columned assembly hall, where the nobles dined together, and the triple-columned convention chamber connected therewith, are particularly cheerful rooms. Even to the present day the simple assembly hall, with its beautiful fireplace, its chandeliers of elk antlers and its old German furniture, preserves its power of inspiration. Here it was that Emperor William II. gave a magnificent banquet to his generals and the nobles of the province after his triumphal entry into the castle during the imperial ma-

mückung der Marienburg" (Society for the Restoration and Embellishment of Marienburg), the president of which is the provincial governor Von Gossler, has endeavored to give that semblance of animation to the many halls and chambers by which alone the impression of a completed task is given. In this respect an important acquisition was made in Theodore Blell's magnificent collection of weapons and in the magnanimous gift of a large collection of coins by Dr. Jaquet. Everything that in any way relates to the history of the order is eagerly brought hither, so that in a very short period valuable historical treasures will be preserved in the castle.

Viewed from the exterior, the castle of the order presents a charming picture, replete with the thoughts, the ideas and the noble spirit of the art that restored the old structure to its former splendor. A similar impression is received by regarding the castle from the river, on the banks of which there rise the central

Baltic founded by the Teutonic Order more than six centuries ago.—Waldemar Schrey, Illustrirte Zeitung.

LABORATORIES OF CORNELL UNIVERSITY.*

By L. B. ELLIOTT.

ALL the laboratories are abundantly supplied with compound microscopes, and also with dissecting microscopes, according to their needs, and with specimens for illustrating the various courses, and for research work, whether the forms required are native or have to be procured from a distance. The recent development of reliable depots for laboratory supplies renders it convenient and inexpensive to place before classes the most desirable material in sufficient quantity for dissection and microscopical study. The laboratories

* Abridged from the Journal of Applied Microscopy. Published by Bausch & Lomb Optical Company, Rochester, N. Y.

GENERAL LABORATORY FOR BACTERIOLOGY AND PATHOLOGY.

are all provided with their type collections of prepared slides, some for class use as guides to what a typical preparation should be, others for the demonstration of subjects too difficult for class preparation or which would not be likely to be met with in the course of the work. Small libraries are attached to all the laboratories and contain only such books as are required for actual use during the laboratory exercises, it being the policy of the university to concentrate the library in such a manner that it will be equally accessible to all. The general library is therefore the Mecca of all the special as well as the general students, and no more congenial place for study could be devised than its excellently arranged reading rooms. The special libraries are very complete for each of the groups of sciences, and great attention has been paid to current periodical literature as the basis for advanced work.

The laboratories of Microscopy, Animal Histology and Embryology, and of Bacteriology and Comparative Pathology are newly constructed and may be taken as types of properly arranged and equipped modern laboratories. They are located on the upper floor of the new Veterinary College building.

Laboratories of Microscopy, Histology, and Embryology.—The general laboratory is designed for eighteen students at one time, as a larger number cannot be given the desired personal attention. Each student is provided with a compound microscope having coarse and fine adjustment and fitted with two eyepieces, and with a low and medium power dry, and with a one-twelfth inch oil immersion objective, triple revolving nose piece, Abbe condenser, and iris diaphragm. This equipment is considered the least which should be provided for microscopical work. Each student also has a whole table to himself and is furnished with a locker convenient to his table, wherein he may keep all his accessory apparatus and supplies.

Two pieces of apparatus are always to be found on the table, a small glass waste jar, over the top of which (see figure) there is a pair of connected metal rods supporting a small metal funnel. In preparing slides they may be laid on the rods and irrigated, or staining material placed on the object. When it is desired to drain off superfluous stain or to wash the preparation, the slide is stood on end in the funnel until drained. The other article is the eye shade, consisting of a metal base formed of a small tin dish filled with lead, into which a wire bent at right angles at the top is inserted. Upon the bend of the wire is hung a sheet of common manila paper of such a length that it shall be just above the stage of the microscope. As the student sits facing the light, the eye shade is placed in front of the microscope and excludes the light both from his eyes and from the upper surface of the object.

Each microscope owned by the laboratory has a separate locker with combination lock. The microscope lockers are all contained in a large cabinet which in turn has heavy doors with safety locks. One or two students, as the case may be, are assigned to use one microscope, and to them only is given the combination of the lock securing the instrument.

The sink, shelves of reference books, and chemicals are centrally placed so as to be equally accessible from all parts of the room. The chemical shelves are arranged on either side of a niche containing a small balance, so that the student may select and measure out at once the exact amount of material required, and that it shall be done at that one place only. At the lower end of the room a special table supports a large paraffin bath, containing twenty-four separate drawers, one for each student. This bath is kept running at a constant temperature, the students not being required to attend to it. One table is provided with Bunsen burners and supports for heating dishes, also the

paratus on the reagent boards and put them in the lockers again, leaving the laboratory as clear as before, no misplaced articles, no apparatus exposed to dust and danger of breakage, and above all the habit of "method" instilled into even these well grown pupils.

This is one of the few laboratories in the country where it is deemed necessary to teach the student the proper use of his tools before he is given journeyman's work to do, and one of the still fewer number in which will be found an accessory equipment adequate or planned for the purpose of demonstrating the points which the student will be required to know in order to do intelligent work with the microscope. The course in the practical use of the microscope extends over five weeks, consists of lectures and laboratory work, and forms the basis for all the other courses in which the microscope is used.

The idea is to have the student actually do all of the

LABORATORY TABLE

operations necessary for practical work and to give him such information that he will be able to strike out independently and intelligently in any direction in which his investigation may subsequently lead him.

The research laboratory is provided with the same kind of tables, stools, and lockers as the general laboratory, also special table for Bunsen burners, etc. The microtome is one of the most used instruments here, and the table in the middle of the room is provided with two of the most complete instruments obtainable, one for serial work, the other for collodion sectioning and cutting large pieces of tissue and large objects. The assistant professor's roll top desk and revolving bookcase occupy a quiet corner. A large aquarium with a constant supply of running water furnishes living material. The card cabinet and cabinet of prepared microscopic objects is also found here, the latter containing the especial series illustrating the more difficult problems considered.

As the collection grows it classifies itself, new specimens being recorded on cards already containing the record of similar material or adjacent to it, and being assigned adjacent positions in the trays.

The card cabinet is also used for bibliographical purposes and for recording the results of observations and all kinds of information.

The Bacteriological and Pathological Laboratories.—The special features of the general bacteriological laboratory are the incubator room with its three large incubators for pathogenic and special cultures. (All connections between the incubators, sterilizers, and burners and the gas supply are made by means of

There are several large hot air sterilizers all grouped under the hood. The steam sterilizers are of special construction and of ample size for the accommodation of the sterilizing receptacles of an entire section.

The nivellating table is designed to take the place of the usual forms of nivellating apparatus, as it is itself perfectly level, is provided with several shelves divided into compartments, the whole being covered with a glass hood, excluding dust but not light. The area in the middle of the room is occupied at one end by a large slate-topped table with a large water bath, and at the other by a revolving bookcase holding the standard reference works, two reading tables, and chairs. The work in this laboratory is of the most practical character. Each day's work is definitely outlined, and reference sheets giving explicit directions for every operation which the student is expected to perform are supplied. The general course of the work is outlined in a general lecture covering several days of laboratory work. The student is taught from the first the importance of a thorough knowledge of the apparatus which he is to use and the importance of the scientific care and cleansing of it. The microscopic equipment is the same as in the microscopic and histological laboratories, and the most of the students have had their preliminary training in the use of the microscope there. The research laboratory has a roll top desk and revolving bookcase for the assistant professor, lockers, tables, stools, microtome table, sink, etc., as in the laboratory "A" described. There is in addition a full set of incubating and sterilizing apparatus, including a large autoclave. The professor's room is divided by a partition into an office room with desk, bookcases, card and specimen cabinets, and tables, and a private laboratory fitted up with all the apparatus necessary for the culture and study of bacteria and allied forms.

While this article deals especially with the laboratories of plant and animal histology, bacteriology, and pathology, it should be said that excellent laboratory facilities are also offered in entomology and invertebrate zoology, in vertebrate zoology, in mineralogy and petrography, in physics, and in chemistry. Naturally, however, the work in those departments, except perhaps entomology, is not so largely microscopic.

TUBERCULOSIS AND VINEGAR.*

By JOHN ASHBURTON CUTTER, B.Sc., M.D.,
New York City.

IN the bibliography appended, much of which is from the publications of this association, I show what has been done by an American writer.

BIOLOGICAL.

The morphology of the blood in health is as follows: "Color.—Bright, fresh, clear, ruddy, strong. Clotting, rapid and firm.

"Red Corpuscles.—Arrange themselves in nummulations or are scattered evenly over the field; normal in size; non-adhesive; central depression well marked on both sides; periphery well rounded, clean cut. Hold coloring matter firmly. Pass readily to and fro through the fibrin filaments. Appear fresh and fair.

"White Corpuscles.—Normal in size, not enlarged by internal collections of foreign bodies. Amoeboid movements strong or not. Proportion, 1 to 300 of red corpuscles. Consistence good, not sticky. Color a clean white. Freely moving at will.

"Serum.—Clear and free at first sight from any form. After fifteen minutes, most delicate semi-transparent fibrin filaments appear, forming a very light network in the field, which offers no obstacle to the passage of the corpuscles."

The morphology of the blood in tuberculosis is as follows:

"First or Incubative Stage.—Red blood corpuscles are less in number, ropy and sticky more or less, but not much changed otherwise.

"Second Stage of Transmission.—1. Red corpuscles: Color pale, non-lustrous; not clear cut, not ruddy. Consistence sticky and adhesive. Coating of neurin removed. Not so numerous as in normal blood. Owing to the increased size and strength of the fibrin and the stickiness, they form in ridges, rows, but not so marked as in rheumatic blood. They accumulate in aggregations of confused masses, like droves of frightened sheep. They adhere to each other, and are rotten, as it were, in texture. 2. White corpuscles: enlarged and distended by the mycoderma aceti, or spores of vinegar yeast, that are transmitted into the blood stream from the intestines. 3. Serum more or less filled with the spores of mycoderma aceti or vinegar yeast. These occur either singly or in masses of spores, which is the common form in which they are found, wherever vinegar is produced. The fibrin filaments are larger, stronger, more massive, than in health, and form under the microscope a thick network which is larger, stronger and more marked in direct proportion to the severity of the disease or the amount of accumulation. Besides, the serum is apt to be of a dirty ash color. The sticky white corpuscles, the massive fibrin filaments in skeins, and the yeast spores alone or combined, form aggregations, masses, collects, thrombi and emboli which block up the blood vessels of the lungs soonest, because exposed to cold air the most of any viscus; the blood vessels contract and thus arrest the thrombi and form a heterologous deposit, which is called tubercle.

"The Third Stage of Tubercular Deposit.—These deposits increase so long as vitality subsists in the tubercle and surroundings. When vitality ceases, the tubercle softens or breaks down. Sometimes, if the process is very slow and life slightly inheres in it, the proximate tissue undergoes fatty infiltration which preserves it from readily breaking down. The morphology of the blood is the same for the second and third stages of consumption.

"Fourth Stage, Interstitial Death.—The red corpuscles are thinner, paler, much lessened in number, increased in adhesiveness, stickiness and poverty; devoid more or less of neurin. The white corpuscles are fewer in number, more enlarged, often ragged and rough. Distended with spores of mycoderma aceti; more adhesive and sticky. The serum: fibrin filaments are thickened, stronger, more massive, and more skeins of

* Abstract of a paper presented to the Section on Physiology and Dietetics, at the forty-eighth annual meeting of the American Medical Association, held at Philadelphia, Pa., June 1-4, 1897.—From the Journal of the American Medical Association.

HOOD FOR STERILIZERS, SLATE-TOPPED WORKING TABLE AND GENERAL REAGENT CASE IN BACTERIOLOGICAL AND PATHOLOGICAL LABORATORY.

paraffin cans. All processes which require heat are done here only. The microtomes are placed on a separate table and all sectioning must be done here.

There is a complete photographic laboratory which may be used from either of the general laboratories on the floor and which contains all the necessary apparatus and chemicals for developing, printing, and finishing the prints. The simplicity and practical nature of this whole arrangement is best seen when the laboratory is in use. When the students enter, the room is entirely clear, not a bottle or dish in sight except the small glass waste jar and eye shade on each table. It is, however, but the work of a moment for each to open his locker, secure microscope, reagents, and material, all of which are placed on the work table, and commence work. At the end of the period a scarcely longer time is required to replace the ap-

small lead pipes. This pipe offers the advantage over rubber hose that it does not rot out and does not permit the escape of gas into the air. In case of a burner lighting back, the lead pipe will not burn as rubber would. The connection between the lead pipe and the gas pipe or burner is made by means of rubber tubing, and where burners are to be moved about, the rubber tube can be a foot or so long. The student's everyday cultures are kept at the proper temperature in a gigantic incubator which stands in the work room. Each section has its own shelf in the incubator, and each student's cultures, be they few or many, are kept in an easily sterilizable tin receptacle specially provided for that purpose. Each work table has a Bunsen burner with by-pass, so that the flame may be shut off with the exception of a small side flame, which ignites the main flame by simply turning the valve open.