the sun was free from spots. I find that I observed the sun, for the purpose of mapping its spots, Dec. 5, at eight A M., Washington (Penn.) local time, and it seemed to be entirely clear. The instrument used was a four-inch refractor. Thinking I might have overlooked some small ones, I observed it again with an eight-inch refractor at half-past one, power of a hundred and fifty, and did not see any spots. The contrast between the sun's face, Dec. 5, 1883, and Nov. 5, 1883, is very marked. I find I mapped seven groups on Nov. 5, 1883, one of them having eight well-developed spots. D. J. McADAM.

Washington, Penn., Dec. 19.

On the care of entomological museums.

The editorial comments on this subject in *Science* for Dec. 19 are certainly very pertinent. For a long time I have been at work on the micro-lepidoptera of North America, until now I have by far the largest collection of the Pyralidae, Tineidae, and Pterophoridae of this country, and a collection of the Tortricidae of the world, fuller and more complete, probably, than any other in existence. My work has hitherto been, in a great measure, to get the insects authentically named by a careful comparison with the original types, in order that the collection, already so large, should prove in some sense an authoritative standard for comparison. This work has, of course, given me an opportunity of observing the condition of the types of North-American microlepidoptera in the collections both of this country and Europe, and the care which they have received.

In some American museums the insects are looked after by men who have to gain their livelihood in some vocation remote from the museum. The authorities of other museums have the impression that they have made adequate provisions for the preservation of their insect-collection when it is put under the oversight of an assistant, although he may have no knowledge whatever of such objects. It is not surprising that so many types are represented in these museums by a labelled pin only.

One great trouble is, that many museum officials have very little appreciation of the vast amount of labor, care, skill, and knowledge required to bring together, properly arrange, preserve, and make accessible to those who are competent, and desire to study any one or more of the insects in it, a large and varied collection. One director told me that it did not seem profitable to pay a man two thousand dollars to watch a thousand dollars' worth of insects; and yet he was not at liberty to dispose of them, so they must go to destruction.

At present I believe the museum at Cambridge is the only one in this country which gives assurance that a competent curator of entomology will always be employed; yet I think it is not provided with means to purchase collections of insects. The National museum has appointed an honorary curator; but it might as well be without any as to have one whose entire time is occupied elsewhere, for who would think of donating valuable and perishable types to a museum thus officered!

As matters now stand, it is better for those who are able to dispose of their collections without a consideration to allow them to go to the Museum of comparative zoölogy; but, if they are not able to give them, they should go into the hands of private individuals who are working on that particular class of insects. It is better for them to be sold to the European museums, where they will be preserved, than for them to go to destruction in a museum of this country. C. H. FERNALD.

State college, Orono, Me.

Your remarks, p. 540, in regard to the preservation of insect-collections are eminently proper and to the point, with the exception of the closing assertion, which is not justified. It is true that the curatorship of insects in the National museum is at present honorary, and that there is no paid assistant; but it is equally true, that, since my charge of that department, all collections and every single specimen received at the museum have been properly cared for; so that where, up to three years ago, nothing of the many valuable collections brought to the museum remained, there is now the nucleus of a collection; and so long as I am curator of the department, honorary merely though the position may be, no material shall go uncared for. Feeling that a beginning toward a national collection had to be made, and that the museum was the proper place for it, I have thus far given my time to this object in the belief that proper financial provision will be forthcoming for such conduct of the department as will guarantee both the preservation and the future care of collections. When such provision is made, my own private collection, and others that I know of, will be donated to the institution. Until then much valuable entomological material will naturally be lost to the capital.

C. V. RILEY.

[We neither expressed nor intended any slur whatever upon the present honorary curator of the insect-collections of the National museum. As any one can see, our remarks applied to the perpetual care of valuable collections. If they are not insured perpetual care, the less of them that go there the better. And so we repeat, that "the appointment of an honorary curator is worse than useless. It only deceives those who know no better, into the supposition that collections sent to the museum are insured proper care. They are not." We regret if the present honorary curator feels hurt by this 'closing assertion;' but it is the only logical outcome from our previous remarks, which he characterizes 'eminently proper and to the point.' — ED.]

THE CHEMICAL LABORATORY OF THE JOHNS HOPKINS UNIVERSITY.

IN 1876, the year in which the Johns Hopkins university was opened to students, a small chemical laboratory was built. It was large enough to accommodate about forty working students, and was well equipped with the necessary conveniences for chemical work, from the most elementary to the most advanced. In the course of a few years, temporary desks were put up wherever an available corner could be found, and finally it became evident that a larger building must be erected. Accordingly, the trustees voted to enlarge the old laboratory so as to make room for a hundred students. The work has recently been completed; and,

as the new laboratory is the result of a great deal of thought, it is believed that a brief description of it would be of interest and value to the readers of *Science*.

The laboratory adjoins the biological laboratory lately described in these pages. A space of forty feet in width separates the two buildings, securing ample light for both. The north

FIG. 1.— NORTH END OF THE JOHNS HOPKINS CHEMICAL LABORATORY, FACING THE STREET.

end presents a frontage of fifty-five feet on the street. A view of the street end is given in fig. 1. It extends back from the street about one hundred feet, the back part being eleven feet narrower than the front. It is built of the finest pressed bricks, and ornamented with a bluish sandstone, and presents a handsome, substantial appearance. On the east is one of the university buildings, containing the general library. The south end receives light unobstructedly, the nearest building being somewhat more than one hundred feet distant. The intervening space is the property of the city, and will not be occupied by buildings. Thus from all four directions the laboratory is well lighted, and there is practically no danger that the light will be interfered with.

Entering from the street, we find ourselves in the corridor of the first floor. On the left is the gas-analysis room, so situated that the direct light of the sun cannot enter it. It is fully equipped for all kinds of analytical work with gases. The apparatus of Bunsen, and the more rapid though less accurate apparatus of Hempel, are always ready for use. The floor, the joints of which are laid in white lead, is made of carefully selected strips, and thoroughly oiled and waxed. Further, it slants slightly from all points towards one corner of the room, where there is a box at a lower level, containing a bottle arranged so as to catch any mercury that may be spilled. Next on the left there is the photometric room. The walls of this room are black, and the windows are pro-

vided with black Venetian blinds, which, when drawn, exclude all light. The polariscope, spectroscope, goniometer, photometer, and photographic apparatus are used here.

On the right, next in order, is the first of the three large working-rooms for students, known as laboratory A. Its dimensions are thirty by

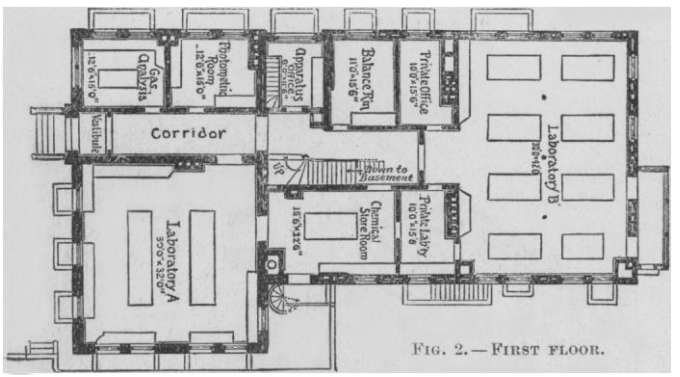

FIG. 2.—FIRST FLOOR.

thirty-two feet. The work of those who are in the earliest stages of their course is carried on here. Forty students can be accommodated in this room at one time without inconvenience. Adjoining it is a large storeroom, in which the chemicals are kept, and the solutions for the reagent-bottles prepared.

On the opposite side of the hall are the apparatus-office and a balance-room. The office is connected by a stairway with the store-rooms for apparatus, which are in the basement. All necessary apparatus is loaned to students who sign receipts for whatever they may take; and the cost price is charged for any thing which may not be returned in good condition.

Passing on, we enter laboratory B, which was the main working-room of the old laboratory. It measures thirty by forty-two feet, and has places for thirty students. Those who work in this room have had some preliminary training. They are here engaged in complicated qualitative mineral analyses, preparations, and quantitative analyses. The office and private laboratory of Associate-Professor Morse adjoin this room, and open into it.

The arrangements for sulphuretted hydrogen deserve special mention. As is well known, this valuable gas is the chief source of discomfort in chemical laboratories; and chemists will, perhaps, wonder and doubt when it is stated, that, in the laboratory under consideration, its familiar odor is practically unknown. This desirable result is reached by providing for it, not a separate room, as is customary, but a separate, thoroughly ventilated building, immediately adjoining laboratory B, but completely isolated from it. It is provided with a high chimney, and means are taken which not only ought to, but actually do, secure a constant upward draught. It contains a large gas-generator, which furnishes sulphuretted hydrogen, and which is in charge of the janitor, who is required to see that it is kept in order. All work with noxious gases must be carried on in the 'stink-room,' under penalty of the law. The experience of the past year has been such as to lead the writer strongly to advise all who have any thing to do with building chemical laboratories to see that they are similarly provided.

Having thus taken a hasty glance at the first floor, we may pass to the second. Here we find the main lecture-hall, with a large preparation-room opening into it. Over the lecture-table, extending nearly the entire width of the room, is a large hood of galvanized, corrugated iron. This is connected with a ventilating-flue, the opening of which is about fifteen feet

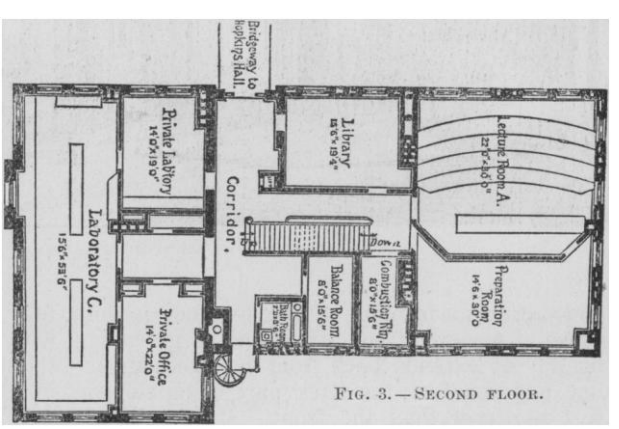

FIG. 3.—SECOND FLOOR.

long by three feet wide, extending upward through the roof. A row of gas-jets may be lighted at the lower end of this flue, thus securing a remarkably efficient ventilation. On the table there is also a closed hood, and a pipe with down draught.

The library is unusually well supplied. It

contains full sets of nearly all the important chemical journals; and all the current journals are received in exchange for the *American chemical journal*, which is published under the auspices of the Johns Hopkins university. Books may be taken out of the library by any one working in the laboratory. He is only required to sign a receipt, and leave it with one of the assistants, who acts as librarian. Notwithstanding the freedom allowed in the use of the books, only one insignificant volume has been lost during the past eight years.

Passing to the north end of this floor, we enter laboratory C, or the research-room. This is well lighted by windows on the north side, as well as on the east and west. It measures fifty-three and a half by fifteen and a half feet. It is perhaps the handsomest room in the building. The walls are of cream-colored glazed bricks, the color of which is relieved here and there by a row of delicate blue. The windows are large. The table-tops are of black-walnut, the lower parts of light wood. The most advanced work, including the researches, is carried on here. Most of the students who occupy the places are looking forward to taking the degree of doctor of philosophy within a year or two. The instruction is under the immediate supervision of the director of the laboratory, Professor Remsen, whose private laboratory and office adjoin the room.

On the third floor the principal room is intended for a chemical and mineralogical cabinet. It is furnished with cases, like some of those used in the National museum at Washington. The object of the collection which has been begun is not show, but simply instruction. A curator has recently been put in charge, and it is hoped that before a great while the results of his care will be apparent. The idea which is to guide him is this: to get together good specimens of all available substances which are strictly chemical, then such minerals as illustrate the forms in which the different elements occur, and, finally, specimens

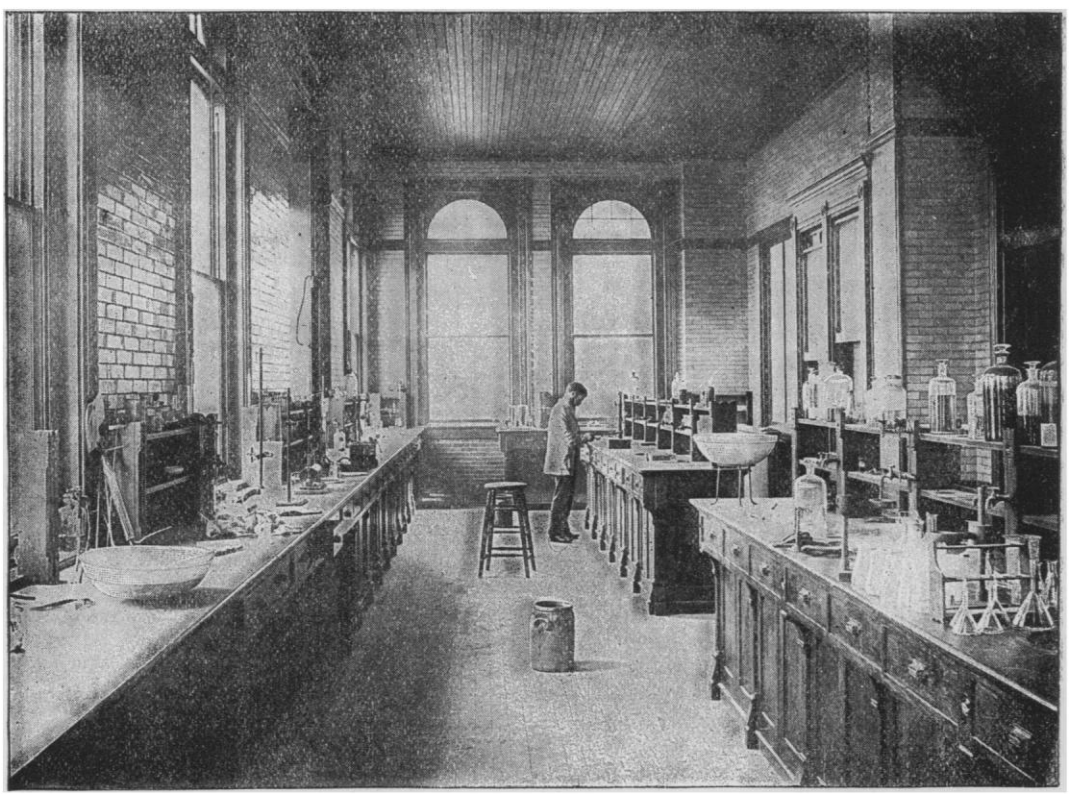

FIG. 4.—RESEARCH-ROOM IN THE JOHNS HOPKINS CHEMICAL LABORATORY.

which illustrate the most important applications of chemistry to the arts. The first two classes are already well represented, and a fair beginning has been made on the third.

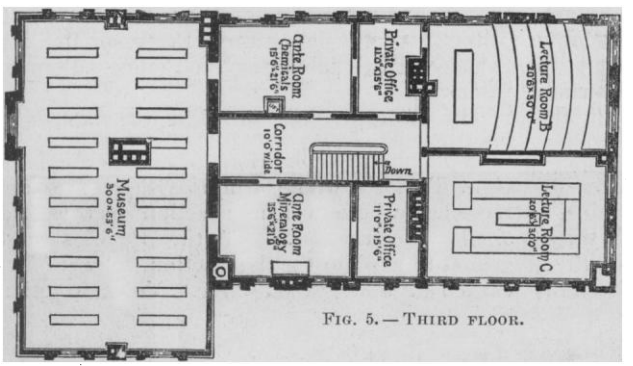

FIG. 5. — THIRD FLOOR.

It is, however, in connection with the third class that the chief additions will be made for some time to come.

On the third floor, in addition to the cabinet, there are two lecture-rooms, — one for chemistry, and the other for mineralogy, — besides two small laboratories for the examination of minerals, and the preparation of specimens for the museum.

There remains only the basement, which is well lighted, and really amounts to an additional story. It is, of course, largely taken up by storerooms and the heating-apparatus; but there are, in addition, two convenient large rooms, which have been fitted up for furnace-operations. In one of these are, among others, two smelting-furnaces of the extremely convenient form in use in the assay-laboratories connected with the U. S. mints. All the necessary conveniences for assaying ores have been secured, and it is intended that all students of pure chemistry shall at least know what assaying is. It is not proposed to go into the teaching of applied chemistry in any narrow sense, but rather "to afford the thoroughly-trained chemist an opportunity to familiarize himself with some of the more important applications of his science."

In conclusion, it should be stated distinctly that the laboratory not only works well on paper, like some of the chemical reactions which students are wont to originate, but, as a matter of fact, it has been found to be extremely convenient and practical. The flues draw in the right direction; the desks are large enough, more space being allowed each individual than in any laboratory known to the writer; the light is good; the water and gas supplies are ample: in short, no serious complaint has been made against the working of any essential feature, though a large number of students have been constantly engaged in it during the year. It is believed that in its present condition it affords facilities for every kind of chemical work. 'Conveniences' have not been unduly multiplied, as the director's experience has led him to the belief that it is possible to make a laboratory so extremely convenient that it is difficult to work in it. It may safely be asserted that all really valuable forms of apparatus or arrangements for special operations have been taken into account, and embodied in the building.

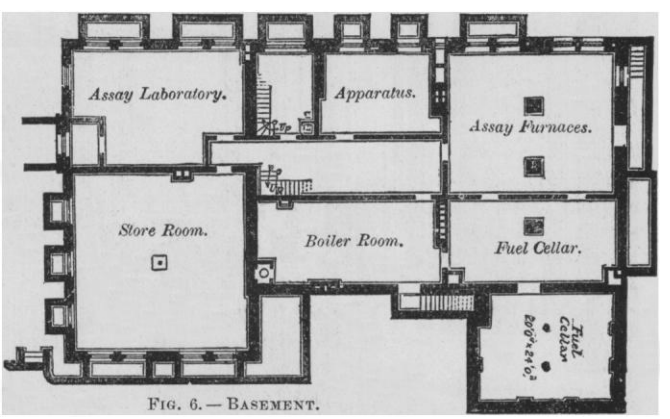

FIG. 6. — BASEMENT.

THE TILE-FISH.

IN the spring of 1879 a Gloucester fishing-schooner, accidentally fishing on the Gulf-Stream slope south of New England, found in abundance a fish which later proved to be new, and was described under the name of Lopholatilus chamaelionticeps, but which the fishermen named tile-fish. The fish-commission later found that it possessed excellent edible qualities; and the prospect of thus adding a new fish to our east-coast food-fishes created a stir at the time. So bright were the prospects, that a fishing-vessel was even being fitted out