

and 125° Cent. without injury. Dr. Koch gives directions for the preparation of specimens of bacteria.

MR. G. BENTHAM has presented the Linnean Society a contribution containing the results of his study of the *Orchideæ*. He groups them into five tribes and twenty-seven sub-tribes.

FRANCIS DARWIN, in a recent number of *Nature* gives a review of Dr. Hermann Muller's work on Alpine Flowers. Of course the relation of Alpine Flowers to insects is the burden of the book, which must be an extremely interesting one. One of the most striking facts is that in Alpine regions butterflies predominate, largely replacing the Hymenoptera of the lowlands. With this change of guests must come a change in structure, for a corolla that will admit a bee, will by no means necessarily be fertilized by the proboscis of a Lepidopterous insect. Thus, members of the same genus will have open mouthed corollas in the lowlands, and contracted throats in the Alpine regions, may be with no opening but the minute "butterfly-door." The relation existing between the colors of flowers and insect visits is also considered and is by no means the least readable part of the book.

Notes on Modes of Work in the Laboratory of Prof. de Bary in Strassburg, Germany. I.—There are two reasons why some statements under the above heading might be of service in our country: first, because of the simplicity of the appliances used in one of the most productive botanical laboratories abroad, and second, because the modes of investigation, though not entirely unknown or untaught here, merit a wider diffusion.

Taking up the first of these reasons, we may say that microscopy, simple and pure, has done good work here in getting us instruments of great efficiency at lower rates than formerly, but has proved so attractive that it has lured to itself absolutely many who might well bestow a portion of their time on real biological investigation. Indeed, it has even gone further and, by some means, induced a feeling, on the part of those contemplating the purchase of a microscope, that they will wait until they can obtain one of the highest grade. This reminds one of a physician resolving to go on foot until he can drive two horses, ignoring the fact that one might render him essential service, to start with, at least. There is ordinarily no objection to the most costly instrument (save its size,) and it is, beside, supposed to be fitted for all manner of work; but on the other hand, it is to be remembered that nearly all (not to say all) the best botanical work has been done in Europe with extremely cheap microscopes, i. e., a mere stand with good eye-pieces and good objectives. And I may also add that Robert Brown's work was done in part, if not entirely, with a simple microscope, and that the recent solid contribution to American biological literature, *Leidy's Rhizopods*, was made with the little Hartnack, and the Beck Economic Microscopes. So then I make this statement at the outset, that for fifty dollars one may purchase an American Microscope which will do as good work as those found in European Laboratories. On my table lies a cut of a Zentmeyer instrument, named by him the American Student Stand, with 1 Eye-

piece (A or B); 8-10 objective, 24°; 1-5 objective, 75°; and Walnut Case, which, with Lock and Handle, is sold at \$38. There are other instruments at as low, or nearly as low prices, which are also capable of doing as good original work. Now then I will make the direct statement. If you contemplate purchasing a microscope, do not delay until you can purchase the most complicated. You will be astonished when you come to discover the real capacity of such as I have indicated.

The instruments most in use in the laboratory of Prof. de Bary are those of Hartnach, small, compact, without sub-stage or without joint to turn the tube back. The optical parts are of course good and give a magnifying power of about six hundred diameters.

MEANS OF MAKING SECTIONS. Razors alone are used. These may or may not be flat on one side. The knife which we have here specially made for the purpose is not requisite, and therefore an unnecessary cost. Neither do we find *in use* the expensive section holders, which figure so conspicuously on the tables of our amateurs. As a means of holding a small soft specimen, pith taken from any plant which furnishes it more than half an inch in diameter is sufficient, and is much better than cork, which is often used in the English laboratories, as the latter often contains grit enough to dull the razors. The cylinder of pith is simply cut down the middle and in pieces sufficiently long to be comfortably held by the thumb and finger, and the object is placed between. Or, for very small, precious objects, a few drops of stearine are allowed to fall from a candle on a glass slide, then, when cool, the object placed upon it, and a few drops more placed on top and the whole allowed to harden, then by *slightly* warming the slide, the mass may be removed and held as in the case of the pith. The adhering stearine has the advantage of being readily removed by alcohol from the section. As for the object, it is safe to assert that the custom is to make it as thin as possible, and always much thinner than we are accustomed to make it here. As a rule, the mounting medium is glycerine, and no attempt is made at staining or double staining. To make a permanent mounting of a desirable preparation, the Asphalt cement of Neumann & Son, Berlin, 51 Tauben Strasse, is used, and to prevent this from being loosened by the contraction of the cement as it hardens, a very fine thread of glass is placed under one side of the cover glass. After considerable trial I am very well satisfied a much better mode is to either make a thin ring of a strong solution of gum shellac in alcohol and allow it to harden and then mount as before, or to make the first coat, at least, of this and then place a subsequent coat of Asphaltum over this when it has hardened. I am bound to say that I have used no American cement that I did not like as well as that of Neumann, though, from the fact of its being in use in all the laboratories of Europe, it must have decided merit. It hardens very quickly. For durability, however, one cannot well forget the decided statement of Dr. Carpenter, that, after thirty years experience and trial of gold size, he had come to prefer it.

For the softer, thinner tissues there can be no doubt but the Euro-

pean glycerine mount is better than that in Canada balsam, which we more commonly use. There is a greater sharpness of outline given to the object. Among the instruments we miss from the German Laboratories is the polarizer as a common microscopic adjunct. For the study of starch and for tracing the laticiferous vessels in many cases, it is of the most essential service. The Jackson eye piece micrometer gives way to the simple round disk in the eye-piece and for all practical purposes is quite as good and much less expensive. It is fair to say that, among lower plants, the same reliance we place upon *exact* spore measurements is not found; the evidence based upon them being considered as confirmatory rather than conclusive; and probably with good reason. During the short winter days a large portion of the work done is by the aid of well shaded gas light, the intensity of which is more or less modified by colored chimneys; the flame being round and steady from the Argand burner. All theory aside, I cannot see but that it was as good as that from the coal oil which we insist upon as being essential.—J T. ROTHROCK.

Some New Mexican Ferns. I.—In order that we should gain a correct knowledge of the flora of any section, some knowledge of its soil and climate is essential; a proposition which would seem to apply specially to the ferns.

The whole of New Mexico is a table-land, with superimposed mountains. The country along the rivers is usually very sandy, as are some of the plains between the mountain ridges. Others of these plains are gravelly, while others consist of a fine, deep soil, which, however, is always mixed, more or less, with gravel. So far as my observation goes, no ferns whatever grow in any of these localities. They are to be found only in the mountains. I have not found one fern growing on level ground, or in sandy or alluvial soil. Under these circumstances, we should expect to find the general character of the ferns very different from that of our eastern species. The difference is allowed to become still greater by the great difference in climate. Here, when it rains, it does little else, and when it dries, everything dries, and keeps on drying until it begins to rain again. Not having been here in the spring, I have been unable to gain any exact information as to the extent to which the ferns develop at that season. The most that I have been able to learn is that when there is an abundance of rain or snow during the winter and spring, the ferns spring up. Certain it is, that before the beginning of the rainy season in July, they are all as dry, and apparently dead, as though there had been no period of spring growth. Within a month after the beginning of the rains, they have made a good start, and within another month, the most of them have shown considerable fruit. A few, however, do not mature their spores until late in the fall, appearing to banter Old Winter with the challenge, "Catch me if you can!" These conditions combine to strip the ferns of that freshness and delicacy, or, I may say, that *crisp fragility*, which characterize our eastern species. Those which are not hairy or scaly are thickish and glaucous. The only eastern species that I can now recall as likely to give one an idea of the *tout ensemble* of these species is *Cheilanthes vestita*, Swz., or, to a