placed at twenty-five bushels per acre. A larger acreage has been planted this year than ever before, some growers having one hundred and fifty acres each. If the crop is a good one, it will tax the resources of the "Union" to the uttermost.—*American Agriculturist*.

A NEW ARRANGEMENT FOR USE IN GREENHOUSES.

IN the nursery of M. A. D'Haene, of Ghent, may be seen a new arrangement of the staging, which is worth notice. On each side of the path, which divides the house longitudinally into two equal parts, there is placed a propagating case, devoted to the propagation and germination of plants, and covered by lights which can be pushed away when necessary. Above these cases is an arrangement of stages, on which plants may be placed; these stages are also on rollers, and may be moved aside when it is necessary to work at the case beneath, or when the plants upon them have to be changed. Behind these stages, the glass side of the house, three feet deep, permits the entrance of sufficient sunlight to the frame, so that cuttings can be taken, and seeds, especially those of palms, may germinate. The results which the inventor of this system has obtained so far are most satisfactory.

At the top of the house, the small beams are strengthened by horizontal iron bars, from which orchids, nepenthes, etc., may be hung; in a word, there are, as it were, three tiers, one devoted to the germination and propagation of seeds and plants, another for growing plants, and lastly one for speci-

PROPAGATING PIT BENEATH MOVABLE STAGE.

mens which require to be suspended in baskets or little wooden rafts.

The illustration shows this convenient arrangement.—*The Gardeners' Chronicle*.

ON THE COLORING REAGENTS OF THE FUNDAMENTAL SUBSTANCES OF VEGETABLE MEMBRANE.

By M. L. MANGIN.

THE use of coloring matters in vegetable anatomy has not formed hitherto the subject of methodic investigations. Although the list of reagents used in microscopical studies grows daily, the absence of precise data on their composition, their chemical properties, and the conditions of their action renders the verifications of the results announced very much a matter of chance.

In the researches which the author has undertaken he has proposed to compare the action of the coloring matters with their composition, and to verify analytically the results obtained with coloring reagents. He believes that by defining strictly the nature and the *modus operandi* of these reagents, it will be possible to arrive at a method for the qualitative micro-analysis of the tissues capable of superseding the empirical processes of coloration now used.

In this memoir he concerns himself merely with the fixation of the coloring reagents on the fundamental substances recognized in the so-called cellulosic membrane of plants, this fixation taking place without mordants in a neutral, alkaline, or acid medium.

The various coloring matters of the aromatic series may be divided into two categories: the one is formed of compounds in which a basic coloring matter is united to various acids, mineral or organic; the other is formed of acid colors employed in the state of alkaline salts.

The substances of the first class fix themselves with a variable energy upon the pectic compounds, and thus manifest the acid function of the compounds. They color neither callose nor cellulose. The author mentions the *azo group*, e. g., Vesuvian brown and chrysoidine; the *diphenylmethane group*, e. g., auramine; the *triphenylmethane group*, such as Victoria blue, night-blue, magenta, Paris violet; then all the colors of the *oxazine group*, as naphthylene blue, Nile blue; of the *thiosine group*, methylene blue; of the *eurythine group*, neutral red; of the *saffranine group*, neutral blue, phenosaffranine, Magdala red, etc. The affinity of these colors for the pectic compounds is very

unequal and feeble, as the presence of an excess of acid or glycerin is sufficient to decolorize the tissues more or less quickly.

The second class, formed of the alkaline salts, contains a number of substances which never color the pectic compounds, but many of them fix upon cellulose and callose, proving the basic nature of these bodies. In this class we have an interest only in two groups, the azo group and the triphenylmethane group.

The azo group, if we set on one side chrysoidine and Vesuvian brown, is chiefly formed of alkaline salts, among which we distinguish three important types.

The first type comprises the coloring matters which only contain one azo group, such as xyloidine ponceau, the composition of which is:

To this type belong aniline and toluidine ponceau, naphthorubine, etc., and the tropelines. These substances color the protoplasm yellow, but they have no action upon cellulose or callose.

The second type is formed of substances containing two azo groups, such as orchil red A.

Here belong orselline BB, azorubine, naphthol black, the croceines, etc. The substances color cellulose in a neutral or faintly acid bath, and have no action upon callose.

The third type contains coloring matters of the benzidic series, such as Congo red:

To this type belong Bordeaux extra, Congo G R, Congo-cornith, delta-purpurine G, brilliant Congo G, resulting from the action of the sulphur compounds of naphthol upon benzidine; azo blue, the Congo-cornith B, the benzo-purpurines, the rosazurines, where toluidine is substituted for benzidine, azo violet, benzo-azurine, heliotrope, where dianisidine is substituted for benzidine, etc. These coloring matters, which are ordinarily precipitated by acids, dye cellulose and callose directly in a neutral or feebly alkaline bath.

The triphenylmethane group does not offer such definite relations between the coloring power and the chemical compositions. We distinguish here first a great number of bodies formed of hydrochlorates, sulphate, etc., which dye the pectic compound directly, and then a series of alkaline salts which we divide into three groups. The first group includes acid magenta, acid violet, Bayer's blue, Nicholson blue, etc., resulting from the respective action of sulphuric acid upon magenta, Paris violet C B, diphenylamine blue, or aniline blue. These substances do not color cellulose, but some of them, as the soluble blues, and especially Bayer's blue, color callose. The colorization is the more active as the sulphurization is more complete; thus 6 B blue, a mixture in which trisulphonated triphenylrosaniline predominates, is the most active of the soluble blues.

The second triphenylmethane group is formed of the alkaline salts of rosolic acid, which dye callose and cellulose directly.

The third group is formed of eosines, a salt of fluoresceine, such as eosine, erythrosine, phloxine, which color nitrogenous matters strongly, but do not attach themselves to callose or cellulose.

The manipulative details will be described in a future communication.—*Comptes Rendus, Chem. News*.

BLEACHING WITH SODIUM HYDRO-SULPHITE.

By G. DOMMERGUE.

THE bleaching process with sodium hydrosulphite, which has been industrially employed since 1883, yields excellent results, but, as is also the case with bleaching by sulphurous acid, the fibers thus bleached are unfit for dyeing. For the production of hydrosulphite about 300 lit. sodium bisulphite 35-40 Be. are put into a pine wood tub of 500 lit. capacity, to which scraps of pure zinc are added until they reach the surface of the liquid (the volume of metal must not be more than $\frac{1}{4}$ of the total volume), when the tub is covered up. In order to prevent a too high temperature, earthenware tubes are inserted into the tub, in which cold water circulates. After 1 hour the liquid is drawn off into a tub which is always to be kept full, covered and allowed to stand for 12 hours, when an abundant amount of zinc sodium sulphite has crystallized out. The remaining liquid portion is the bleaching agent. As the latter by the contact with the air is apt to be converted into sodium bisulphite with rising temperature, the tubs for the production of hydrosulphite, as well as for bleaching with it, must always be kept as full as possible and carefully covered.

For bleaching the material is first well cleaned, i. e., treated with sodium carbonate and then with soap, and entered into a 1,000 lit. tub containing a mixture of the bleaching liquid with an equal volume of water, taking care that the tub is nearly filled. After standing covered for 6 hours the yarn is well wrung and piece goods passed through pine wood squeezers above the tub. Then the material is at once washed in filtered water; if this washing is delayed the fibers are, by the contact with the air, rapidly heated up to 70-80°, and largely altered. Sometimes goods thus bleached after finishing show stains which are attributable to remnants of zinc sodium sulphite. They are removed by passing the pieces through a cold, very weak bath of hydrochloric acid and washing in abundant water.

With one single bleaching tub 3,000 pieces of woollen goods at 100 m. each, i. e., about 36,000 kil. wool, can be bleached per year. About 100 kil. zinc serves for several years, because the undissolved metal can be rendered serviceable for further use by washing it with abundant water which is feebly acidulated with hydrochloric acid. The price of bisulphite is about 25 fr. (\$5) per 100 kil. When the bath falls below its original level, it is filled up with dilute hydrosulphite, whereby the strength of the bleaching bath is preserved for

almost an unlimited period. In a tub of 1,000 lit. capacity about 130 kil. wool can be entered at a time, the cost amounting to about 1.36 fr. (about 26 cents) per 10 kil. fiber. The simple and cheap process, which is in some factories worked since several years, is probably destined in no distant time to supersede the ordinary bleaching methods.—*Chem. Ztg.*

ACTION OF THE CHLORIDES OF CALCIUM AND MAGNESIUM UPON COTTON.

THE use of these chlorides is now so common in the preparation of sizes for finishing cotton goods that the following observations of Grimshaw are of great importance and will, perhaps, explain the deterioration which has been lately sometimes observed in cottons. It is not a new observation that, when the chlorides of calcium and magnesium are heated in contact with air, a portion of this chlorine is given off. In view of the very large quantities of both these substances used in the sizing and finishing of cotton and other goods, it is evident that it is of considerable interest and importance to define at what temperature, at how low a temperature, in fact, and to what extent, the decomposition of these salts proceeds, because, if the chlorine is liberated at temperatures to which it is at all likely that the fabrics containing them may be subjected under the ordinary conditions of their use and manufacture, then the chlorine, or resulting hydrochloric acid, will be certain to cause more or less deterioration of the fabrics.

We know that at a red heat the chloride of calcium becomes alkaline: to litmus, and that, at temperatures considerably lower than this, the chloride of magnesium parts with an appreciable amount of its chlorine. Recently, several cases of deterioration of the strength of cotton fabrics have been traced to the action of chloride of magnesium, and we may take it, I think, as an undoubted fact, that this 'tendering' of the cotton fiber in such fabrics is due to the action of the hydrochloric acid formed by the decomposition of the chloride. I am making an attempt to define, with accuracy, the lowest limit of temperature at which the decomposition of the chloride of calcium and magnesium, and, incidentally, the chloride of zinc, takes place; the extent of the decomposition, and the influence that time, and the presence of moisture, have upon this, and I am able to give some figures which, though only of a preliminary nature, are of interest on some of these points. These few preliminary experiments would appear to establish the fact that, at any temperatures which can possibly prevail in the manufacture or use of goods containing the calcium chloride, this salt is perfectly stable, and no fear of deleterious action need be entertained, while the reverse in the case with the magnesium chloride. The figures for the latter show that this salt is decomposed comparatively readily at a low temperature: a temperature of 117° C. is one which, in some operations, the fabric may easily attain, and it would appear likely that an even lower temperature may effect this.—*Jour. Soc. of Chem. Industry*.

SULPHONAL, PARALDEHYD AND CHLORAL-AMIDE.

THE Therapeutic Committee of the British Medical Association has drawn up a report as to the comparative utility of different hypnotics. The points especially dealt with are (a) the doses of the drug given; (b) whether sleep is produced with certainty, how soon it comes on, and how long it continues; (c) the production of dangerous or other disagreeable effects; and (d) whether the drug loses its effect. The following is a summary of results obtained with sulphonal, paraldehyd and chloralamide:

Sulphonal.—1. *Dose.*—In thirty-two of the cases recorded, 20 grains was given in eleven instances, once at night. Sleep came on in half an hour to three hours, in one case in five hours, and in another in nine hours. A second dose on the succeeding night in one case produced sleep in five minutes. Sleep lasted in four cases all night; in four cases six hours; and in three cases one to two hours. With 25 grains (four cases) sleep came on in two hours and lasted six hours or all night. With 10 and 15 grains there was less sleep produced, and in a case of pneumonia (15 grains) there was no sleep after the drug. The few cases (seven in all) in which 35, 40 and 60 grains were given showed that these doses did not possess greater hypnotic effect than a dose of 20 grains. In a case of chronic gout 30 grains had no effect.

Disagreeable After-Effects.—In six out of ten cases in which 20 grains had been given, disagreeable after-effects were noted. Drowsiness next day was noted six times; giddiness four times; and headache and inco-ordination of gait each twice. In four cases where 10 grains had been given, drowsiness was noted once; in five cases with 15 grains drowsiness was noted twice and giddiness twice; with 25 grains (four cases) drowsiness was noted twice, giddiness once, headache once. In seven cases, with 30 to 60 grains, drowsiness was noted four times, giddiness twice, headache twice, inco-ordination of gait and vomiting each once.

Whether the Drug Loses its Effect.—Several of the cases showed that a second dose on the succeeding night has a greater effect than on the first night. Thus, in one case, 20 grains produced on the first night two hours' sleep with no bad after-effects; on the second, a similar dose produced eight hours sleep with drowsiness, giddiness, and inco-ordination of gait on the following day. In some cases prolonged use of the drug appears to diminish its effect. Thus, in one case (asthma and bronchitis) 20 grains was given every other night for eight weeks. During the first fortnight sleep came on in an hour and lasted twelve hours each night. The drug was then omitted for a week, when the insomnia returned. In the succeeding five weeks the drug, after three hours, produced six hours' sleep. In a case of phthisis 20 grains was given every other night for twenty-six days, except for five days, when the dose was reduced to 10 grains, but afterward was increased. During the time the patient was taking 20 grains, after an hour he slept for four to six hours. The drug was omitted for a fortnight, and, on recommencing it, it produced only drowsiness, and no sleep. In a case of neurasthenia and insomnia, quoted by Mr. Priestley, sulphonal, 10 to 20 grains, did not lose its effect during six months.