HORTICULTURAL EXHIBITIONS, 1875.

JULY.

21.—Royal Horticultural Society, South Kensington. Meeting of Fruit, Floral, and Scientific Committees. Zonal Pelargonium Show.
23 and 24.—Helensburgh and West of Scotland Rosarians' Society's Exhibition. Sec., W. Ure Waddell.
28 and 29.—Preston Floral and Horticultural Society's Exhibition. Hon. Sec., W. Troughton, 4, Church St., Preston.

AUGUST.

2.—Peterborough Flower Show. Sec., F. G. Buckle.
4.—Royal Horticultural Society, South Kensington. Meeting of Fruit and Floral Committees.
6 and 7.—Manchester Botanical and Horticultural Society. Exhibition of Carnations, Picotees, New Plants, &c. Manager, Bruce Findlay.
6 and 7.—Cheadle Floral and Horticultural Society's Eighth Annual Show.
7.—Rossendale Floral and Horticultural Society's Exhibition. Sec., M. J. Lonsdale, Newchurch.
10.—Clay Cross Horticultural Society's Eighteenth Annual Exhibition.
12.—Canterbury Horticultural Society's Exhibition. Sec., Charles Sendell.
17.—Coventry and Warwickshire Horticultural Society's Show at Combe Abbey. Sec., Thomas Wigston, 3, Portland Terrace, Coventry.
18.—Royal Horticultural Society, South Kensington. Meeting of Fruit and Floral Committees.
24 and 25.—Metropolitan Floral Society's Exhibition at the Alexandra Palace.

THE
Gardeners' Chronicle.

SATURDAY, JULY 10, 1875.

APPOINTMENTS FOR THE ENSUING WEEK.

WEDNESDAY,	July 14	Royal Botanic Society's Evening Fête at Regent's Park. Woodford Horticultural Society's Third Exhibition. Loughborough Horticultural Society's Show. Croydon Horticultural Society's Exhibition. Exhibition of Flowers, Fruit, &c., at Oundle. Wimbledon Horticultural and Cottage Garden Society's Show (two days). Sale of the late T. Bowley's Collection of Plants at Blackrock, Dublin.
THURSDAY,	July 15	Colchester and East Essex Horticultural Society's Show. Sale of Orchids, at Stevens' Rooms.
FRIDAY,	July 16	Altrincham and Bowden United Floral, Horticultural, and Rose Society's Exhibition (two days).

WE beg leave to call the attention of our readers to a discovery of the first importance, made by Mr. WORTHINGTON SMITH, in relation to the POTATO DISEASE, and brought under the notice of the Scientific Committee of the Royal Horticultural Society on the 7th inst. We offer our heartiest congratulations to Mr. W. G. SMITH on his discovery, which is narrated in his own words in another column, and we heartily felicitate the Society that in this period of deep depression and dire confusion a member of its Scientific Committee should have, by his brilliant discovery, cast so much lustre on it. To those who with ourselves have consistently advocated and done their best to promote the scientific character of the Society it must also be a matter of profound satisfaction. It is specially interesting also to see how the practical remarks made by Mr. A. DEAN at the former meeting have been confirmed by this discovery of Mr. SMITH'S. One mode of fructification of the fungus producing the Potato disease has, as our readers are aware, been long known through the researches of MONTAGNE, BERKELEY, DE BARY, and others; it has been reserved for Mr. SMITH clearly to demonstrate the existence of the resting-spore and of the antheridium by whose contact it is fertilised. Mr. SMITH has witnessed and depicted the union of the two bodies just mentioned. We hope to be able to publish a woodcut illustration of this in a subsequent number, and we trust Mr. SMITH will, stimulated by his success, pursue his researches and complete what little now remains to be known of the life-history of this fungus. The classical memoir of Mr. BERKELEY was published in the *Journal* of the Society in 1846; Mr. SMITH'S observations were brought under the notice of the Scientific Committee of the same Society the other day. Both are honourable to the Society, and whatever fate befall it, it has earned the gratitude of scientific men throughout the world, for providing the means of making these discoveries public. It is now for the practical men to turn these discoveries to account, and though the prospect is not hopeful, they need at least be no longer led off on a wrong track. Not long since it was surmised that we might have to look to Clover or other plants as the nidus for these resting-spores. We cannot say that this may not be so, but in the meantime Mr. SMITH has found them at home in the Potato, and has conclusively shown that the "new Potato disease," concerning which so much has been lately written, is merely the old disease in a new guise. By some this phase is considered to be the old "curl." We offer no opinion on this matter, but if it be so, then the interest is heightened, as it would prove the existence of the Potato fungus in this country long before the date of its usually assigned appearance. The great difficulty, from a practical point of view, lies in the fact that the fungus and its resting-spores grow and reproduce themselves in the interior of the tuber, leaf, or haulm, where they cannot be got at.

SOME short time since we had occasion to allude in a cursory manner to the great additions to our knowledge of plant-life and vegetable physiology that had been made directly by Mr. DARWIN, and which had accrued indirectly from the great impulse which his zeal and genius had given to other workers. We also took occasion to allude to the benefits that practical horticulture must inevitably derive from his researches when the knowledge of them shall have become sufficiently known to, and appreciated by, gardeners. It must also happen that many will in future modify their practice or adapt their procedures in consonance with the discoveries of Mr. DARWIN, without being at all aware that they are indebted to him in the first instance. A work now before us from the same master hand, supplies additional confirmation to these remarks. The book in question, which is entitled INSECTIVOROUS PLANTS,* is marked in a very strong degree with many of those characteristics which have made Mr. DARWIN'S previous works so remarkable. We have the same clear statement of facts, the same evidence of patient and laborious research, the same simple modesty of expression, the same scrupulous care to give due credit and acknowledgment to the researches of others, the same excellent practice of repeating and summarising important details, the same weaving together into one strand of all the facts and all the inferences; the same unconsciously exerted persuasiveness, which leads the reader on from point to point, and at the end leaves him no choice but to accept the author's conclusions. Our readers have been prepared for this book by the numerous forerunners that have appeared in the shape of different memoirs and records of observations that have been made from time to time of late years in this country and in America.

The address of Dr. HOOKER on carnivorous plants, at the last meeting of the British Association at Belfast, served in a peculiar manner to attract the attention of the public, and to prepare the way for Mr. DARWIN. We must, however, refer to the volume itself for the history and bibliographical references pertaining to the subject, as we can only indicate, and that briefly, some of the leading points in this new work, and equally briefly point out their bearing on scientific horticulture.

The work, then, is a record of experiments and observations made on the common Sundew, Drosera rotundifolia, and on some allied plants, such as Dionæa and Aldrovanda, as well as on Pinguicula and Utricularia.

These observations and experiments may be counted by hundreds upon hundreds; many of them must have required very great care and most delicate manipulation. To avoid risk of error they have been repeated and controlled over and over again. It is necessary to mention this, though no idea can be formed of the great labour and unwearying patience that have been bestowed without reading the work itself. The object of these experiments was to ascertain how the plants in question capture insects, and what they do with them when caught. The results in some cases are very extraordinary. An entirely new light is thrown upon some phenomena of the nutrition of plants, and in several particulars the results are so remarkable that when we first heard of them as matters of rumour we were disposed to be incredulous and sceptical. With the full record before us doubt is no longer possible. There may be occasionally a wrong rendering of facts, there may be a faulty interpretation here and there, or the circumstances may occasionally bear an explanation different from what is put on them; that may be so, but, taking the book as a whole, we venture to say no physiologist will question its main facts, nor the inferences derived from them.

It is not necessary for us to describe the general appearance and outer mechanism of the Sundew, the Venus' Fly-trap, or the Utricularia, as we may safely assume that they are known to most of our readers, while in the case of the rarer Droseras, the Aldrovanda, and other plants mentioned in this volume, there is the less necessity for us to refer to them, as the general results (allowing for a few differences of detail) are the same as in the case of more familiar plants. The greater part, indeed, of the book is devoted to the common Sundew, Drosera rotundifolia. We cannot pretend to follow Mr. DARWIN in all his varied experiments on this plant, but we may say in brief that the leaves of this plant are studded with glandular hairs, which secrete a viscid fluid which serves to detain any unwary fly or insect which alights upon the leaf. The hairs then gradually bend inwards towards the centre of the leaf. More than this, if on the central portion (the disc of the leaf) be placed any small object, organic or inorganic, then, in the course generally of from one to four or five hours the marginal hairs—tentacles, as Mr. DARWIN calls them—bend inwards also, so that an impulse is conveyed from hairs that are directly affected by the impact of any substance to hairs at a distance that are not directly touched. This is a parallel case with the Sensitive Plant, where a similar impulse is conveyed from one leaflet to others at a distance. Having become bent inwards over the captured insect, the viscid secretion before observable in the glands changes its character—it becomes acid; it becomes, in fact, analogous to the gastric juice, and performs the same office—viz., that of digesting animal matter.

But digestion involves not only solution but absorption of the solution, and Mr. DARWIN'S experiments go to prove that both processes take place. Some physiologists, while admitting, from the researches of NITSCHKE and others, that the hairs were sensitive and mobile—that they caught insects by virture of their viscid secretions—yet hesitated to admit that the insects caught were dissolved by any secretion from the plant, still more that that solution could be absorbed. But Mr. DARWIN'S experiments leave but little doubt on our minds that, under the conditions he mentions, the leaves of these plants can and do digest, *i.e.*, dissolve and absorb insects and other nitrogenous matters brought in contact with them, and in this way a considerable side light is thrown on a still vexed question—the power of leaves to absorb water by their surface.

Now if the leaves of this plant can obtain

* *Insectivorous Plants.* By Charles Darwin, M.A., F.R.S. With illustrations. Murray. Pp. 461.

their nitrogenous matter in this way there is the less need of the roots, and as a matter of fact we find that Drosera grows in peaty marshy soil where there is little or nitrogenous matter; and we find, moreover, that the roots are inordinately small—there is relatively little work for them to do, and their size is proportionately insignificant.

Inorganic substances and such as contain no nitrogen cause inflection of the tentacles, but much more slowly; thus, while minute flies placed on the discs of some leaves, and retained there by the viscid secretion, caused the tentacles to infold in a few hours, pieces of paper and moss placed on the leaves caused only a very partial inflection after twenty-five hours: yet these very same leaves energetically responded to the attractions of raw meat. By hundreds of experiments it is shown that it is nitrogenous substances in particular which cause inflection and secretion, and which are absorbed. Light, heat, or moisture *per se* have no direct effect on the process. On the other hand, the extreme smallness and lightness of particles which will by their impact bring about motion of the tentacles is astounding. In one case a piece of human hair $\frac{8}{1000}$ of an inch in length, and weighing only $\frac{1}{787\,40}$ of a grain, excited a motor impulse. On the other hand, drops of water, as in the case of rain, do not cause the tentacles to move.

We have not space to do more than mention the numerous experiments by which it is shown that fluids containing no nitrogen—such as gum, sugar, starch, alcohol, oil—produced no inflection of the tentacles; while milk, albumen, fresh meat, mucus, urine, saliva, isinglass, all produced inflection when the precaution of experimenting on young leaves was taken. Green Pea soup and decoction of chopped Cabbage leaves act in a similar way. Salts of ammonia in solution act most powerfully, even in cases where, when absorbed by the roots, it manifested no such power. Even the vapour of ammonia proved a powerful stimulant. Phosphate of ammonia acts in extremely minute doses. Less than the twenty-millionth of a grain absorbed by a gland of one of the exterior tentacles caused it to bend. This result appeared so incredible that the observations were repeated during fourteen years, but there is no good reason for doubting it, for it is matched, and more than matched, by the astounding results of the spectroscope.

In addition to various salts of ammonia, about fifty other salts, alkaline, earthy, and metallic, were tried; and with the result that, while some did, others did not cause motion of the tentacles. It is most curious to see the antagonism, as it were, between certain substances, *e.g.*, between sodium and potassium—the soda-salts all causing inflection, the potash-salts all being inert or poisonous. Magnesia and lime salts cause no inflection. The one, salt of iron, produced only partial inflection. These results, which are given in full detail, appear to us as likely to be most valuable when corelated with similar observations on the use of the same substances as manurial agents. Nineteen diluted acids caused inflections, while gallic, tartaric, and citric acids produced no effects. A large number of other substances were tried, some producing inflection, others being inert. Camphor is specially noted as increasing the sensitiveness of Drosera.

The experiments we have been alluding to in the last few paragraphs had reference more especially to the power that certain substances have of causing movement in the sensitive tentacles. It is time now to allude to that other series of experiments by which it is proved that the leaves of Drosera "act on albuminous compounds in exactly the same manner as does the gastric juice of mammals; the digested matter being afterwards absorbed." Well may Mr. DARWIN speak of this as "a wonderful fact in the physiology of plants." Our impression is, that here we have the origin of a new theory of plant nutrition, and that many other plants, by means of their root-hairs, or other organs, will eventually be shown to possess properties now known to be possessed only by a very few plants. Be that as it may, it has been conclusively proved that albumen (white of egg) is dissolved by the secretion of the leaves of Drosera; that if an alkali be added digestion is stopped, but is immediately restored when the alkali is neutralised by an acid. Cooked meat, fibrin, cartilage, fragments of bone, even dentine and enamel, phosphate of lime (a most powerful stimulant), were all dissolved, aud the solution absorbed. Raw meat is injurious—causes indigestion, in fact—while skin, fibro-elastic tissue, cellulose, gun-cotton, chlorophyll, starch, fat, and oil, are not acted on.

From pollen grains and living seeds the interior nitrogenous portions are dissolved out just as in insects the hard shell, or wing-case, is unaffected, while the juices and soft tissues are dissolved. The absorption of the dissolved substances depends, as in the case of animals, not only on the presence of an acid, but also of a ferment like the pepsin of animals.

There are many other points to which we might call attention, but it is far better that the reader should consult the book itself. We have said enough to show the exceeding interest of the volume to physiologists and plant cultivators.

From the striking facts elicited with reference to the glandular hairs of Drosera, it was natural to turn to the similar hairs of other plants. Accordingly Mr. DARWIN has put on record a comparatively small number of experiments with Saxifrages, Pelargoniums, Primula sinensis, &c. These glandular hairs have hitherto been thought to be secreting organs only, but we learn from these experiments that they have in some cases the power of absorbing ammonia, both in solution and in vapour.

In regard to this question of glandular hairs, Mr. DARWIN has pointed out a subject for research which will doubtless be eagerly seized by many who have the requisite leisure and ability, and from which great results may be expected. The pitcher-plants, Nepenthes, Sarracenia, &c., did not form the object of Mr. DARWIN'S researches, but we know, from the few observations already made by others, that similar phenomena are exhibited by them.

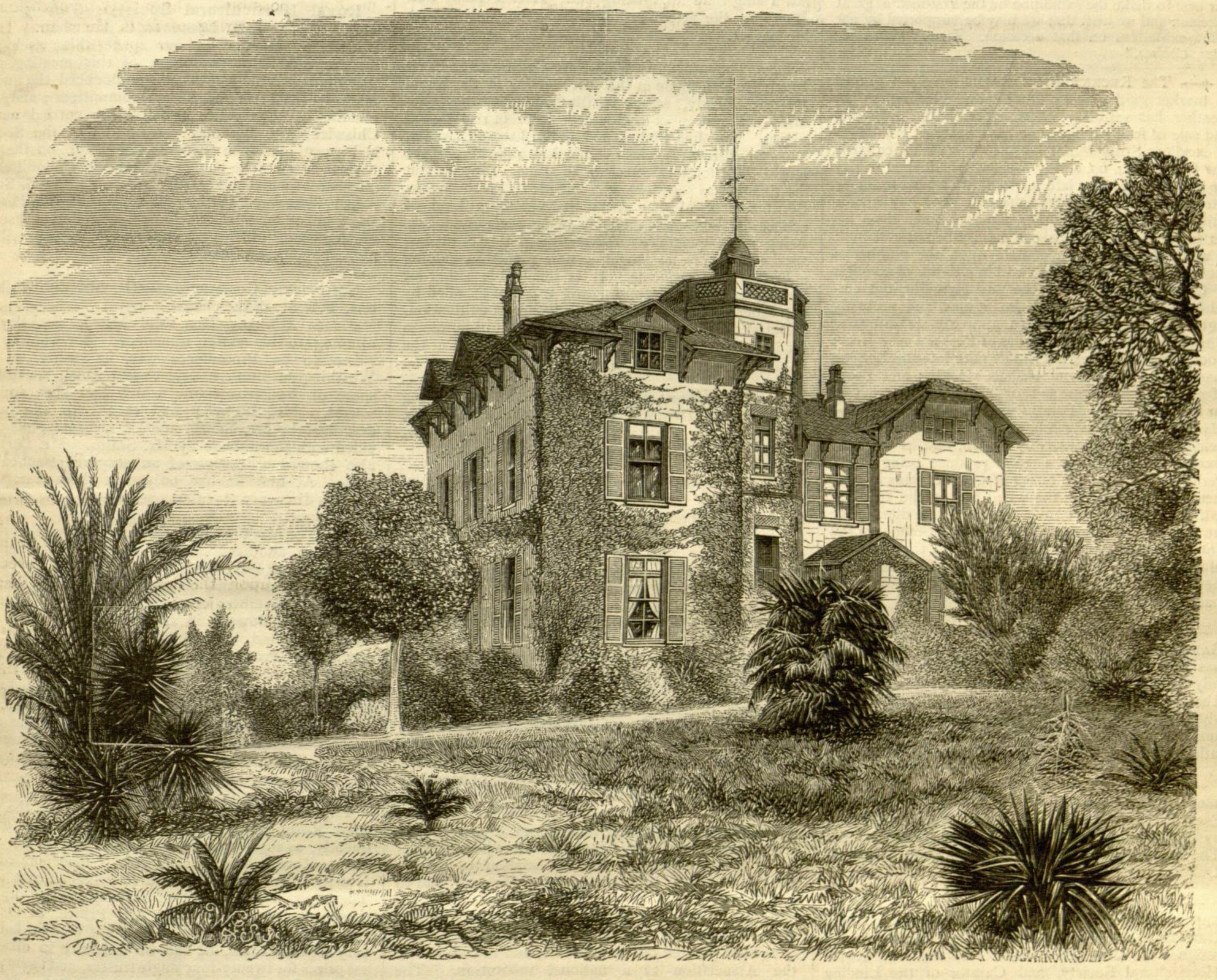

FIG. 7.—M. THURET'S GARDEN AT ANTIBES.

THE meeting of the ROYAL HORTICULTURAL SOCIETY on the 8th inst. was not a little stormy, but its results will be accepted with great satisfaction as the forerunner of a more hopeful era. The necessity for insisting on the resignation of the four members of the Council, who have at length formally completed this process, is made sufficiently