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THE
GARDENER'S
MONTHLY VOLUME.

THE DAHLIA;
ITS CULTURE, USES, AND HISTORY.

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THE DAHLIA.

HISTORY.

THIS most beautiful of our autumn border flowers being a native of the New World was totally unknown to the ancients; indeed it was not recognized by botanists before the close of the last century, nor was it introduced to our gardeners until about forty years ago.

The first discovered species of the genus is that known now to botanists as *Dahlia superflua*, or *D. variabilis*. It was found in 1789, and named by Cavanilles, a Spanish botanist, in honour of Dahl, a Swedish pupil of Linnæus, and a cultivator of the same sciences. Some objections have been raised to the name of Dahlia on the ground that it too nearly resembles that before given to a very different genus, Dalea; but this objection is not sufficient to counterpoise the greater inconveniences attendant upon a change of names. Willdenow, in 1803, gave it the names of *Georgina pinnata*, but though these were

adopted also by M. De Candolle and a few other distinguished botanists, the prior applied names have prevailed, and, according to established custom, have been generally retained.

The plants from which three supposed species of this genus were described, were sent from the Botanic Garden at Mexico to the Royal Garden at Madrid, in which the one, called by Professor Cavanille, *Dahlia Pinnata*, flowered in October, 1789; his *D. Rosea* and *D. Coccinea* produced flowers a few years afterwards, and all were successfully figured and described by him in his "Icones;"—the first in 1791, the two last in 1794; they do not seem, however, to have been successfully treated, for with him they attained the height of three or four feet only, and did not flower till October. In 1802, plants of each were transferred from Madrid to the Jardin des Plantes at Paris, where they grew so well as to enable Mons. Thouin, in 1804, not only to describe and figure them, but also to treat on their cultivation. In May, 1804, seeds of the three kinds were sent from Madrid, by Lady Holland, to Mr. Buonainti, Lord Holland's librarian in England; from these good plants were produced, one of which, the *D. Pinnata*, flowered in September following, and was figured by Andrews, in the "Botanist's Repository." In the succeeding year, plants of the *D. Rosea* and the *D. Coccinea* also flowered in the gardens of Holland House.

Though this importation of the seeds was the most successful as to its produce (for from it nearly all the plants then in our gardens were obtained,) yet the original introduction of the first species was (on the authority of the *Hortus Kewensis*) from Spain, in 1789, by the Marchioness of Bute; but it is probable that the plant so introduced was soon after lost, as we do not find any further notice taken of it. The other species, then called *Coccinea*, was actually flowered by Mr. John Frazer, who is said to have obtained it from France in 1802, the same year in which it was produced in the French gardens from seed procured from Madrid. It also appears, that in the autumn of 1803, Mr. Woodford flowered, at Vauxhall, a plant of Cavanille's *D. Rosea*, which he had obtained from Paris; so that, independently of one introduced by the Marchioness of Bute, in 1789, it seems that both species had flowered in this country before the seeds were transmitted by Lady Holland.

At Madrid they were a long time in the Royal Garden without any indications of change; and it will be seen that after they were spread through Europe, some years elapsed before any extensive increase of variation took place.

Mons. De Candolle, it is said, obtained from Madrid the plants which he cultivated at Montpellier, about the same time they were sent to Paris. His Memoir was printed in 1810, and he therein describes

only five varieties of *D. superflua*, viz., *Rubra*, *Purpurea*, *Lilacina*, *Pallida*, and *Flavescens*, besides three varieties of *D. Frustranea* ; viz., *Coccinea*, *Crocea*, and *Flava*. Probably, when he wrote, he had not obtained any double flowers, though he evidently expected such would soon be produced.

Mons. Otto, as early as 1800, obtained from Dresden, for the Royal Garden at Berlin, a plant of the *D. Pallida* of the "Hortus Berolinensis;" and in 1802, a plant of the *D. purpurea*, of the same work, was sent to him from Madrid ; but he had no new varieties from his own seed till 1806.

The first introduction of the dahlia into the Royal Gardens at Berlin has been already noticed, as having occurred between 1800 and 1805. Mons. Otto informed Mr. Sabine that the chief varieties were raised between 1809 and 1817, but that the first which shewed themselves were produced in 1806 and 1807. About 1813 he began to pay more particular attention to their cultivation, and improved their kinds by cross impregnations of the stigmata of the florets. The first double flower he possessed came from Stutgard ; but a complete double one of his own flowered in 1809 ; it was dark red, exactly similar to that from Stutgard, but had, at first, blown only semi-double. Three more double ones were raised in 1815 and 1816, and he had in 1820 no more than six with double flowers. A pure white single one was given

to him in 1809, and in 1810 he raised another white one himself. He mentions that in the Catalogues of the Nurseries at Berlin, from 80 to 100 sorts are enumerated for sale, but he considers the really good ones to be about thirty.

In our own country we had an early promise of great success, and had we hit upon the right plan of management, in keeping the plants when produced, there is no doubt but we should have been as equally successful as the continental gardeners in obtaining varieties. Mr. Buonainti saved seeds from the plants raised at Holland House, in 1804, the produce of which seeds he states to have given him, in the succeeding year, nine varieties of that which was called *D. Pinnata*, two of which were double, one with lilac and the other with dark purple flowers; of the single flowered plants, some were certainly dark coloured, four figures were published from them at the time; the paler coloured varieties were chiefly considered as belonging to what was then called *D. Rosea*; he had also two varieties of *D. Coccinea*, the original deep coloured one and a paler one, which, though called by him *Crocata*, was the pale yellow variety, as is apparent from the figure of it, published in the "*Paradisus Londinensis*."

Mr. Salisbury also obtained several varieties from the seeds which he received from Holland House in 1806; these he had particularly noticed in his paper

printed in the first volume of the Transactions of the Horticultural Society. In the fifth volume of the second edition of the *Hortus Kewensis*, which was published in 1813, the varieties of *D. superflua*, there named, are Purpurea, Lilacina, and Nana ; the latter being taken from a double variety, figured in Andrews' " Botanical Repository," but which is certainly not particularly entitled to be considered as a dwarf plant. No varieties of *D. frustranea* are given in the *Hortus Kewensis*.

Mons. de Candolle, in his essay on the genus, has observed, that it is not probable we shall ever see a blue one, since the variation is from purple to yellow. He considers blue and yellow to be the fundamental types of the colours of flowers, and that they mutually exclude each other : yellows pass readily into red or white, but never into blue : and in like manner, blue flowers are changed by cultivation into red and white, but never into yellow. (*Hort. Trans.* i. & iii., *Gard. and Flor.* ii. 66.)

Until about forty years ago, no variety was known that did not possess a tinge of purple in its blossoms, and it was even doubted whether a blossom entirely untinged with purple could be produced. (*Hort. Soc. Trans.* vii.)

When Mr. Sabine wrote on the dahlia in 1818, the single varieties only were abundant ; the number of double ones was very limited, but they rapidly in-

creased, and have now nearly expelled the single ones from gardens of repute. The extension of sorts has, however, been limited to the *Dahlia superflua*; the varieties of *D. frustranea* have but little multiplied, and no double flowers of that species have yet been produced. The brilliancy of the colours of the blossoms of the *D. frustranea*, however, is such, that it might have been expected it would have induced some practical horticulturist to apply his skill to their improvement.

A few of the double dahlias which were raised at an early period still hold a place in the estimation of gardeners, but in general those of a few years' standing have yielded their places to a younger progeny, which in their turn may be deprived of their station by fresh productions. (*Hort. Soc. Trans.* vii. 141.)

After 1814, the dahlia was introduced to more general notice, and cultivated in most collections; but it was reserved for the intelligent cultivators of the last few years to circulate it more extensively, and make the most rapid advances towards a state of perfection. Indeed, so lately as less than twenty years since it was considered a perfectly novel sight to witness dahlias with double flowers in the garden of a tradesman or cottager; but, owing to the astonishing rapidity with which new and good sorts have since been obtained and circulated, it is now quite as rarely that we see or meet with a cottager's garden which

does not contain at least a few good dahlias, and many possess plants of first-rate sorts. (*Paxton on the Dahlia*, 9.)

In taking a retrospective view of the dahlia fancy, it is pleasing to remark the gradual improvement of this autumnal favourite up to the present time. This improvement is annually progressing towards greater perfection ; for, of late years, many of the finest varieties have been introduced ; and it is notorious that an established fine seedling, at the present time, will command a higher price than at any previous period. To mark the progress of the dahlia, the stand that obtained the £20 prize for the best twenty-four blooms at the Cambridge Dahlia Show in 1840, contained only one variety that was shown in the first stand of the same number of blooms at the Metropolitan Exhibition of 1846, a brief period of six years. That variety was Springfield Rival, a flower of 13 or 14 years' standing. Both stands were grown by Mr. Turner. The former was considered to be the best that has been produced up to that time, and the latter was certainly the best twenty-four he had shown during 1846. At Cambridge, Unique was what is termed the "bloom of the exhibition ;" Penelope, Amato, Hope, Conservative, Maid of Bath, and many other flowers now out of date, were stars in that superior stand.

The publications which have hitherto appeared on

the dahlia are the following:—Cavanille's "Icones Plantarum qua &c., in Hortis (Hispania) hospitantur," printed at Madrid in 1791, and subsequent years. "Memoire sur la culture des Dahlias, &c. par Mons. Thouin," in the third volume of the *Annales du Museum*, published at Paris in 1804. A communication from Mr. Buonainti, librarian to Lord Holland, on the dahlia, printed at the end of Macdonald's "Gardener's Dictionary;" this appears to have been written about July 1806. "Observations on the different species of Dahlia, &c.," by Mr. Salisbury, read April, 1808, before the Horticultural Society. "Observations on the Culture of the Dahlia in the northern parts of Great Britain," by Mr. Wedgewood, read before the Horticultural Society in November, 1808, and published, together with the preceding, in the first volume of the Society's Transactions. The dahlias are described and noticed by Professor Willdenow, of Berlin, in his "Enumeratio Plantarum Horti Regis Botanici Berolinensis," printed at Berlin, in 1809, and in this he refers to the plates and descriptions of the Hortus Berolinensis, in which they had been figured a short time before; and to his edition of the Species Plantarum of Linnæus. "Note sur la Georgina (dahlia)," by Mons. De Candolle, in the 15th volume of the *Annales de la Museum*, printed in 1810. Instructions for the cultivation of the

dahlias in France, are given by Mons. Dumont de Courset, in *Le Botaniste Cultivateur*.

In 1812, at Paris, M. A. Thiebant de Berneaud, published "Memoire sur la culture des dahlies, &c ;" and in similar floricultural works, Mr. Hogg, Mr. Maddock, and others have written, in this country, upon dahlia culture.

Figures of different varieties of the dahlia, with some observations on each, have, at various times, been published in the *Paradisus Londinensis*, the *Botanist's Repository*, the *Botanical Magazine*, the *Botanical Register*, and other periodicals devoted to flowers.

An expensive work, entitled "The Dahlia Register," intended to have been continued annually, was published in 1836. It contained 53 coloured plates of the best varieties then known. No other volume was published. In 1840, Mr. Paxton published "A Practical Treatise on the Cultivation of the Dahlia ;" and Mr. Turner, in 1846, gave to the public his "Practical Observations on the Culture of the Dahlia."

From all of the foregoing, we have culled the most useful information; and this amalgamated with, and corrected by, our own later experience, will render, we believe, this volume, the most useful and comprehensive authority on the culture of the dahlia that has hitherto appeared.

BOTANICAL CHARACTER.

THE DAHLIA SUPERFLUA, parent of all the beautiful double varieties of our gardens, like the other species of the genus, is a native of Mexico. It was first discovered there by Baron Humboldt, growing in the sandy meadows of its mountain districts, at an elevation of between four and five thousand feet above the sea. Humboldt sent it to the Botanical Gardens at Mexico, and thence, as we have already stated, it was transmitted to Madrid.

The genus dahlia is included in the Syngenesia superflua Class and Order of the Linnæan System; and in the Compositæ of the Natural arrangement. Its characteristics are as follow.

Common Calyx double; the outer of several leaves, 6 or 7, ovato-spatulate, reflexed; inner of one leaf, cup-shaped, in several ovate segments. *Corolla*, compound, radiant; florets of the centre perfect, with a tubular, stalked, five-cleft petal; those of the radius fertile, with an ovate three-toothed petal, equal in number to the segments of the calyx. *Stamens* (in the perfect florets) filaments five, broadest at the base, inserted into the bottom of the petal; anthers united into a tube. *Pistil*: Germen somewhat spatulate, obscurely triangular, notched at the top;

style thread-shaped ; stigmas somewhat spreading, pubescent. *Seeds* solitary, shaped like the germen. *Receptacle* flat, chaffy ; the scales large, the middle ones keeled, the rest flat. Down none.

Although the stems are too tender to endure the low temperatures of our winters, yet they are not strictly annual, for, we find that, in the mild climate of Devonshire, Mr. Murray, gardener at Taymouth Castle, had in the gardens there early in July, 1845, two dahlias, (*Phenomenon* and *Andrew Hofer*,) in full bloom, after having withstood the winter's cold, in the open air, preserving their previous year's stems and foliage. (*Gard. Chron.* 1845, 562.)

VARIETIES.

Every autumn of the last thirty years has added to numbers of our superior varieties, so that now they amount to many hundreds, and each characterised by some peculiarity of size, habit, form, and colour. It is satisfactory to the physiological botanist to find that, notwithstanding the great diversity of colour thus exhibited, still the conclusion arrived at by M. De Candolle remains intact. We have seen, as stated in a previous page, that he concluded upon scientific data that a blue dahlia would not be produced by the florist, and cer-

tainly no such colour has yet been found in the petals of the thousands of seedlings annually bloomed.

We subjoin a list of dahlias, both show flowers, and those known as fancy varieties, which are the best out up to the present time, both for showing, and the flower border. An asterisk denotes those with long stout footstalks, which, with the fancy kinds, are best adapted for grouping and bedding out.

Fancy Varieties.—There is still much difference of opinion respecting what really are fancy varieties, for we find flowers in some catalogues of fancy dahlias, which in others are described amongst the ordinary varieties. Our definition is that, all varieties with two or more colours may be termed fancy dahlias; especially if the edges or tips are of a colour lighter than that of the chief surfaces of the petals. To be a valuable flower in this class, there should be great contrast, with an equal distribution of colour, whether it be tipped, striped, margined, or spotted.

It will be useful to note the following definitions usually employed in describing dahlias.

The appellation of *florets* should be applied in all cases to what have been improperly called the petals; they are strictly, and especially in single flowers, the *florets of the ray*; when there is an allusion to the short florets in the disk of the flowers, they are distinctly the florets of the disc. The term *quilled*, in its strict sense, is applied to ligulate florets become

tubular, but it is generally used to express a tendency only to that habit. In the descriptions, for the sake of discriminating the differences with greater accuracy, the terms *quilled* and *half-quilled*, are used ; but for the latter term, *somewhat quilled* is not unfrequently substituted. The florets are said to be *reflexed*, when the whole are bent backwards, exposing the disc. They are *recurved*, when they are turned backwards at the points. The *scales* are the bracteæ of the involucre, and in single flowers are situated behind the florets of the ray, one scale belonging to each floret ; when the florets of the disc give way to, or are changed into, florets resembling those of the ray, the scale accompanies the transmutation, so that in double flowers a series of scales is found behind every series of florets, and when these scales appear in the centre or disc, without being accompanied by ligulate florets, it is known, that although by some abortion they have not been produced, yet that whenever the plant blossoms perfectly, the flowers will be entirely double, that is, devoid of disc. These scales cannot be confounded with the small scales or paleæ of the receptacle, the former being much larger, and generally dark green. (*Hort. Soc. Trans.* vii. 144.)

WHITE.

- **Antagonist* (Bragg), 1843, height 4 ft.
- Empress of Whites* (Heale), 1845, 2 ft.
- Princess Helena* (Gaines), 1847, 3 to 4 ft.
- **Queen of Sheba* (Watkinson), 1847, 4 ft.
- Schneerose von Esterthab* (Deegen), 1846, 4 ft.

WHITE ; TIPPED, EDGED, AND SHADED WITH
CRIMSON.

- Beauty of Sussex* (Mitchell), 1843, 3 ft.
- Delicata* (Turner), 1847, 4 ft.
- **Emily* (Dosset), 1847, 4 to 5 ft.
- Marquis of Worcester* (Sealey), 1847, 4 ft.
- **Northern Beauty* (Robinson), 1842, 6 ft.
- Princess Radziwell* (Gaines), 1846, 3 to 4 ft.
- Grah* (Drummond), 1846, 3 to 4 ft.
- Star* (Bragg), 1847.

WHITE ; TIPPED OR EDGED WITH PURPLE OR
LILAC.

- Alice Hawthorn* (Sainsbury), 1845, 4 ft.
- Beauty of the Plain* (Spary), 1840, 3 ft.
- **Lady St. Maur* (Brown), 1844, 4 ft.
- **Lady of the Lake* (Keynes), 1847, 4 ft.
- **Lady Featherstone* (Spary), 1846, 4 to 5 ft.

Marguarita (Paris), 1847, 4 ft.

Metropolitan Queen (Jullien), 1847, 4 ft.

**Miss Vyse* (Turner), 1847, 3 ft.

YELLOW.

**Cleopatra* (Attwell), 1845, 6 ft.

Goldfinder (Bushell), 1847, 4 ft.

Yellow Standard (Keynes), 1847, 3 to 4 ft.

ORANGE AND BUFF.

Aurantia (Spary), 1844, 3 to 4 ft.

**Bertha Von Gena* (Koek), 1846, 4 ft.

**Biondetta* (Paragot), 1845, 6 ft.

**Countess of Brandon* (Spary), 1846, 5 ft.

Gloria Mundi (Headley), 1845, 5 ft.

Golden Fleece (Pearce), 1847, 4 ft.

Lady Leicester (Girling), 1845, 5 ft.

Princess de Joinville (Fourquet), 1846, 3 ft.

LILAC.

**Athelete*, 1844, 4 to 5 ft.

Chef d' Ouvre (Dubras), 1846, 4 ft.

Dasinski, 1846, 4 ft.

**Mrs. Anderson* (Girling), 1846, 5 ft.

Queen of Perpetuals (Girling), 1846, 2 to 3 ft.

Victorine (Bushell), 1847, 4 ft.

PURPLE.

- **Bermondsey Bee* (Prockter), 1844, 4 ft.
- **Candidate* (Silverlock), 1842, 6 ft.
- **Floribunda* (Pearce), 1846, 6 ft.
- **Pickwick* (Cormack), 1840, 4 ft.
- **Prometheus* (Wildman), 1846, 6 ft.

PEACH LILAC.

- Dawn of Day* (Mitchell), 1846, 3 ft.
- Rose d'Amour* (Brown), 1846, 4 ft.

DARK SHADED.

- Raphael* (Brown), 1844, 4 ft.
- **Vanguard* (Turner), 1846, 3 to 4 ft.

SCARLET AND ORANGE SCARLET.

- **Baron Von Rothschild* (Werker), 4 ft.
- Duchess de Montpensier*, 1846, 4 ft.
- Nonpareil* (Prockter), 1844, 4 ft.
- Scarlet Gem* (Turner), 1847, 4 ft.

CRIMSON AND ROSY CRIMSON.

- **Beeswing* (Sainsbury), 1845, 4 ft.
- **Capt. Warner* (Girling), 1846, 3 to 4 ft.
- Caractacus* (Sorrell), 1846, 4 ft.
- **Cassandra* (Fellows), 1847, 6 ft.

Dr. Graham (Girling), 1846, 4 ft.

**Erectum* (Mitchell), 1846, 4 ft.

Lord St. Maur (Wheeler), 1847, 4 ft.

**Louis Philippe* (Turner), 1847, 5 ft.

**Perpetual Grand* (Brown), 1843, 5 ft.

**President of the West* (Whale), 1840, 5 to 6 ft.

**Sir E. Antrobus* (Keynes), 1846, 5 ft.

**Springfield Rival* (Inwood), 1833, 5 to 6 ft.

**Standard of Perfection* (Keynes), 1844, 4 ft.

**Victory of Sussex* (Stanford), 1843, 6 ft.

DARK CRIMSON AND MAROON.

**Admiral Stopford* (Trenfield), 1842, 5 ft.

Berryer (Turner), 1847, 4 ft.*

**Essex Triumph* (Turrille), 1843, 4 ft.

**Octavian* (Pearce), 1846, 4 ft.

**Queen of Gipsies* (Girling), 1844, 5 ft.

ROSE.

Adonis (Dubras), 1847, 4 ft.

Competitor (Hodges), 1841, 3 ft.

Dowager Lady Cooper (Jackson), 1842, 4 ft.

**Duchess of Richmond* (Fowler), 1839, 5 ft.

Exemia (Girling), 1843, 3 to 4 ft.

Felix (Drummond), 1847, 4 ft.

* This is the darkest variety known, and a valuable acquisition.—G. W. J.

- **Lady Stopford* (Trenfield), 1846, 5 ft.
Queen (Widnall), 1841, 4 ft.
Queen of Roses (Widnall), 1844, 3 ft.
Rosetta (Girling), 1847, 4 ft.
Sir J. S. Richardson (Sharp), 1844, 4 ft.

ROSY PURPLE OR LILAC.

- Essex Rosy Lilac* (Turville), 1846, 3 ft.
Fulwood Hero (Teebay), 1845, 4 ft.
 **Indispensable* (Girling), 1841, 5 ft.
Marquis of Aylesbury (Spary), 1846, 3 ft.
Mrs. Shelly (Mitchell), 1843, 4 ft.

BLUSH.

- Beauty of Hants* (Oakley), 1846, 4 ft.
 **Marchioness of Cornwallis* (Whale), 1846, 3 to 4 ft.
Miss Sarah (Edwards), 1846, 4 ft.

BUFF, TIPPED OR EDGED.

- Andromeda* (Collison), 1847, 5 ft.
Melanie Adam, 4 ft.
Princess Royal (Hudson), 1842, 5 ft.

YELLOW-EDGED OR TIPPED WITH RED.

- **Aurora* (Hale), 1847, 4 ft.
Lady Sale (Smith), 1845, 3 to 4 ft.
 **Madame Zehler* (Zehler), 1846, 4 ft.
Serviteur de Madame Zehler (Zehler), 1847, 4 ft.

FANCY DAHLIAS.

CRIMSON, WITH WHITE TIPS OR STRIPED.

- Erecta* (Girling), 4 ft.
Hector (Freulle), 4 ft.
Hermione (Mohring), 4 ft.
Ludwig Marquard (Sieckman), 3 ft.
Prima Donna (Spary), 3 to 4 ft.
Quinola (Poulet), 3 ft.

RED, WITH WHITE TIPS OR STRIPES.

- Admirable* (Girling), 3 ft.
Baron Hugel, 4 to 5 ft.
Boquet de Bruiel, 3 to 4 ft.
Harlequin (Dodd), 4 ft.
Ludwig Pems (Deegen), 4 ft.
Nihil (Baillie), 5 ft.
Schone Von Zerbst (Hoffman), 4 ft.
Stern Von Zerbst (Hoffman), 3 to 4 ft.

PURPLE, TIPPED OR STRIPED WITH WHITE.

- Erzherzog Stephan* (Deegen), 4 ft.
Eugene Sue (Mea), 3 to 4 ft.
Eveque de Dijon (Paulet), 4 ft.
Gizelle (Truelle), 3 ft.
Madame Wachy (Wachy), 4 ft.

Master Edward Clayton (Jeffrey), 4 to 5 ft.

Master George Clayton (Jeffrey), 4 ft.

Miss Watson (Girling), 4 ft.

Pantaloon (Bragg), 4 to 5 ft.

Souvenir (Girling), 4 ft.

Sully (Cressac), 3 to 4 ft.

Surprise (Oakley), 3 to 4 ft.

YELLOW, TIPPED WHITE.

Adolph Dubras (Vicomte de Ressequier), 4 ft.

Mimosa (Truelle), 2 to 3 ft.

Queen of the French (Burgess), 4 ft.

Thomirin, 4 ft.

MAROON, WHITE TIPS.

Madame Wallner (Girling), 4 to 5 ft.

Ober Justizrath von Werthoff (Miller), 4 ft.

Roi des Points (Batteur), 4 to 5 ft.

ROSE, ROSY LILAC, AND WHITE.

Bijou (Vicomte de Ressequier), 4 ft.

Bijou de Closhault, 4 ft.

Bijou de Dijon, 3 to 4 ft.

Madame Chauviere (Girling), 4 to 5 ft.

Madame Dresser (Deegen), 3 ft.

Miss Maria Clayton (Jeffrey), 4 ft.

CARMINE AND WHITE.

Coquette (Schmidt), 5 ft.

Fra Diavolo (Girardoni), 4 ft.

Triumph von Magdeburg (Ehrig), 4 ft.

BUFF OR SALMON, TIPPED.

Captivation (Salter), 3 to 4 ft.

VARIOUS—STRIPED, SPOTTED, ETC.

Alexander Schultz (Deegen), 4 ft.

Goldfinch (Turrelle), 4 ft.

La Carnation (Girling), 3 ft.

Mirocolant (De Knuff), 3 ft.

Multicolor Admirabilis (Mardner), 3 to 4 ft.

Triumph Von Anhalt (Hoffman), 4 ft.

Zebra, Yeeles, 4 to 5 ft.

CHEMICAL COMPOSITION.

WE have no entire analysis of any part of the dahlia, but chemists have ascertained that its tubers contain a large proportion of a peculiar feculous substance, to which the name of *Dahline* or *Inuline* has been given. It chiefly differs from starch in one property, viz., that the latter is rendered blue when treated with iodine, whereas iodine imparts to dahline a yellow colour.

Dahline is found in the roots of many other plants, such as those of the Jerusalem Artichoke (*Helianthus tuberosus*), Pellitory of Spain (*Anthemis pyrethrum*), Meadow Saffron (*Colchicum autumnale*), Succory (*Cichorium intybus*), Dandelion (*Leontodon taraxacum*), Angelica (*Angelica archangelica*), Elecampane (*Corvisartia (Inula) helenium*), and *Datisca cannabina*.*

When the roots of any of the above plants are rasped, subjected to pressure, boiled in water, the infusion filtered through linen while hot, boiled until a pellicle forms on the surface, and then left to cool, a white powder precipitates. This is dahline, and only requires to be collected on a filter, well washed and dried. One hundred parts of the roots of the dahlia

* Chemists, considering that they had discovered in each case a new principle, have called dahline by other names, as *Inuline*, or *Helenine*, when found in *Inula helenium*; *Alantine*, when from the Angelica; and *Datiscine*, when from the Datisca.

yield 10, of inula 11, 1, of leontodon 12, and of cichorium $12\frac{1}{4}$ of dahline. (*Raspail's Organic Chemistry*, 137.)

CHARACTERISTICS OF EXCELLENCE.

WE know of no flower more totally altered by cultivation than the dahlia, and not any one only acquainted with that flower in its natural form, reading the characteristics we shall presently record as requisite to be combined for entitling a variety to be classed among first-rate flowers, could conceive that they are applicable to its progeny.

Before proceeding to the detail of those desired characteristics, we must place before our readers some most excellent warnings against the hasty condemnation of a variety that may seem not to be permanent in its excellencies.

The dahlia, it is truly said, is subject to vary so much in different situations and seasons, that great difficulty exists in gaining an accurate knowledge of the merits of each kind, especially of those which have been only seen for one season. The circumstances under which it is grown are also so various, that unless you see the plant, you cannot fairly judge of the merits of the flower. Great attention is requisite, in order, if possible, to find out what particular culture

a given plant has been subjected to; for example, whether the shoots have been much thinned, the flowers shaded, much manure given, or none at all, &c.

The following facts with regard to new kinds of dahlias should always be borne in mind before condemning them the second year:—

1. That the seedling plant is much debilitated by propagation, and therefore the flowers are rarely as good the second season as they are the first and third.

2. That the best flowers are obtained from those plants struck from the first cuttings produced by the mother plant, notwithstanding that they are seldom as strong as the cuttings that are afterwards produced.

3. That exciting the roots by means of a strong heat early in the spring, and striking the young plants on a strong dung bed, tend to weaken the plants so treated to such a degree, that they frequently require two or three seasons to recover, and regain their original character. Thus, it is found that good flowers are obtained with the least trouble from those plants kept in pots the first season after striking (termed by the trade pot-roots); planted out the following season, and allowed to start of their own accord.

4. That in wet seasons manure is frequently very

injurious, from its causing the plant to grow luxuriantly, and thus to produce but few flowers; while in very dry seasons, it is equally beneficial. Much more depends on a change of soil, than on its composition and quality.

5. That water is a point which cannot be too much attended to; a great difference is caused in the same flower by hard and soft water; but still more depends on the manner in which it is applied, for one or two good waterings are much better than a small quantity given three or four times a week.

6. That taking up the roots immediately after a frost has destroyed the top, is the principal cause of so many roots dying during the winter season. (*Gard. Chron.* 1841, 19.)

The most just codes of excellence relative to the dahlia have been promulgated by Mr. Wildman and Mr. Glenny, agreeing on the principal points, but each so supplying deficiencies occurring in the other, as to induce us to republish both.

The first is the code of Mr. Wildman, communicated by him to the London Floricultural Society, and approved by that association.

I. FORM.—The outline, in profile, should be that of about two-thirds of a globe or sphere, and as shewn in this engraving, the rows of florets forming

this globular outline should describe unbroken con-

centric circles lying above each other with evenness and regularity, and gradually diminishing till they approach the crown. The florets forming these rows should be spirally arranged, and alternate, like the scales of a fir cone ; those in each superior row concealing the joints in the row beneath, and causing the circle to be unbroken and complete. They should be broad at the ends, perfectly free from notch or indentation of any kind, firm in substance, smooth in texture, uniform in size, and evenly and freely expanded in each row, but largest in the outer ones, gradually and proportionably diminishing until they approach the crown, where they should gently turn the reverse way, pointing inwards, and forming a neat and close centre.

II. COLOUR.—If in a self, it should be dense and clear; if in an edged flower, concentrated and well-defined: in both cases it should penetrate through the petal, with an appearance of substance and solidity.

DEFECTS.—The following are the defects:—*In Form*—Want of roundness or of depth, flatness of face, squareness of shoulder, sinking in the centre. *In the Rows*—Wide interstices between the florets in each row, or between the rows themselves; broken circles, overhanging each other, or diminishing abruptly; want of arrangement, and looseness. *In the Floret*—Notches or indentations on the edge, sharp points, angularity, cupping too deeply with wide mouths; abrupt hollows in the face, or ribbiness; being too broad, coarse, or overwrapping each other sideways, or being too narrow and guttery, or not touching each other in the rows; quilling or curling, or shewing the back in any manner; curling too much upwards, turning quite back, or being upright in the centre; want of substance, and not concealing the scale. *In the Colour*—Cloudy, not mottled; thinly laid on in patches or in spots, or variable; not being the same at the back as on the face of the petal. *In Size*—Being below the average, or so large as to be coarse. *Disqualifications*—Shewing yellow disk or a hard and scaly centre, cross eye, petals damaged in any manner, blooms dead or decay-

ing. The object ought to be to obtain freedom without looseness, boldness without coarseness, and symmetry and uniformity without stiffness or formality. (*Gard. Chron.* 1843, 87.)

Mr. Glenny's code of excellence is comprised in these requirements :—

1. FORM.—The flower should be a perfect circle when viewed in front ; the petals should be broad at the ends, smooth at the edges, thick in substance, perfectly free from indenture or point, stiff to hold its form ; should cup a little, but not enough to shew the under surface. They should be in regular rows, forming an outline of a perfect circle, without any vacancy between them ; and all in the circle should be the same size, uniformly opened to the same shape, and not rubbed or crumpled.

2. The flower should form two-thirds of a ball when looked at sideways. The rows of petals should rise one above another in rows ; every petal should cover the join of the two petals under it—what the florists call imbricating—by which means the circular appearance is perfected throughout.

3. The centre should be perfect ; the unbloomed petals lying with their points towards the centre, should form a button, and should be the highest part of the flower completing the ball.

4. The flower should be symmetrical. The petals should open boldly, without showing their under-side,

even when half opened, and should form circular rows, uniformly laid, evenly opened, and enlarging by degrees to the outer row of all.

5. The flower should be very double. The rows of petals laying one above another, should cover one another very nearly; not more should be seen in depth than half the breadth; the more they are covered, so as to leave them distinct, the better in that respect; the petals, therefore, though cupped must be shallow.

6. SIZE.—The size of the flower when well grown should be less than four inches in diameter, and not more than six.

7. COLOUR.—The colour should be dense, whatever it be—not as if it were a white dipped in colour, but as if the whole flower was coloured throughout. Whether tipped or edged, it must be free from splashes or blotches, or indefinite marks of any kind; and new flowers, unless they beat all old ones of the same colour, or are of a novel colour themselves, with a majority of the points of excellence, should be rejected.

DEFECTS.—If the petals show the under side too much, even when looked at sideways—if they do not cover each other well—if the centre is composed of petals pointing upwards, or those which are round the centre are confused—if the petals are too narrow, or exhibit too much of their length—or if they show

any of the green scale at the bottoms of the petals—if the eye is sunk—if the shoulder is too high, the face flat, or the sides too upright—if the petals show an indenture as if heart-shaped—if the petals are too large and coarse, or are flimsy, or do not hold their form : in any or all these cases the flowers are objectionable ; and if there be one or two of these faults conspicuous, the flower is second or third-rate.

If flowers are exhibited which shew the disc, or a green scale, or have been eaten by vermin, or damaged by carriage, or are evidently decayed, the censors should reject them at once.

Characteristics of the Plant.—Although the form of the plant is quite of secondary consideration, and is only to be regarded as subservient to the more important consideration of exhibiting the flowers to more advantage as they grow, yet it is a matter worthy of some notice. Mr. Paxton's observations upon it are very judicious. He says, the general figure should be uniform and compact, that is, it should gradually enlarge from the lowest lateral shoots to the extremity of those highest, and it should be devoid of a straggling or rambling habit. Secondly, the plant should be disposed to bloom freely and numerously. Thirdly, its blossoms should stand out clearly from the foliage, on short, strong flower-stalks, so as to be presented boldly and advantageously. (*Paxton on the Dahlia*, 99.)

OF STANDS OR COLLECTIONS.

Variety of colour forms a distinct excellence, and if disposed uniformly, it is another excellence; a third excellence is contrast. If light and dark flowers, and middling, were in a stand of twenty-four, there are several ways of being uniform: say L means light, D dark, M middling, the following would be instances of uniformity:—

L	D	M	L	L	M	D	L
M	L	D	M	M	D	L	M
D	M	L	D	D	L	M	D

L	M	D	L	L	D	M	L
D	L	M	D	D	M	L	D
L	M	D	L	L	D	M	L

(*Gard. and Flor.* i. 56.)

CUTTING BLOOMS TO SHOW.

For this purpose, it is necessary to look more to fine flowers than to new sorts. Look well to the properties of the flowers, and take those which approach the nearest to perfection in form, whether they be old or new. In making up a stand, contrast of colour should, however, be observed as much as possible, and they should be placed on the stand uniformly;

there should be colours of about the same depth at the four corners, and if these are light, those next to the corner ones should be dark ; but there are several modes of doing them uniformly. The top and bottom row should be alike as to their colour. Suppose the stand to be twelve, they may be arranged either of the ways pointed out here, or any other way that preserves uniformity.

Light	Dark	Dark	Light
Dark	Middling	Middling	Dark
Light	Dark	Dark	Light
Dark	Middling	Middling	Dark
Light	Dark	Dark	Light
Dark	Light	Light	Dark

Half the stands are spoiled by putting too many dark purples in them ; and although form ought to be the first consideration, contrast and order, or uniformity, adds greatly to the merit of a stand. (*Gard. and Flor.* ii. 30.)

Selecting the blooms for exhibition often puzzles the most experienced growers ; the dark selfs being so much more numerous and superior in shape to the light flowers ; that, in selecting twenty-four, one or two points often have to be sacrificed—either shape, or contrast in colours. We recommend that as much diversity of colour should be introduced as possible,

with due regard to shape and perfect centres. Much can be done by arrangement ; yet we often see stands contain a whole row of flowers of great similarity. At all times place deep circular flowers at the four corners ; and select quality before size. If a bloom is observed to be shaky behind, or inclined to open in the centre, when packing up your box, it may safely be concluded that it will not make one of the number required, by the time it is wanted. Discard it at once, and look for the next best of the same sort.

If the blooms are intended to travel a long distance, provide plenty of young ones in addition.

Never, unnecessarily, handle the blooms. It should be remembered that all this pains-taking has been to produce them in the highest state of perfection, to be looked at only. The dead appearance caused by rough usage can never be removed. (*Turner on the Dahlia*, 6.)

Mr. Glenny, whose opinions on all points connected with floriculture merit attention, recommends (*Gard. Gaz.* 137) that for exhibition, dahlia blooms should be cut before too old ; the boxes soaked in water for an hour or two before the blooms are packed in them ; and when taken out, not to be touched, as there will be a brilliant fresh dew upon them. If the stoppers of the tubers be soaked at the same time, they swell all they can, and there is no doing so after they are in the tubes. If stoppers are absent, they may be

made of potatoes; and the blooms should be so high above the tubes that the lower petals do not touch the board.

Exhibiting Stand.—Dr. Lindley says, the dimensions of a dahlia stand for twelve blooms should be twenty-two inches long by sixteen and a half wide, four in depth, and five and a quarter from tube to tube: sixteen and a half by eleven and a quarter will be the proportion for a stand of six. The surface of stands is generally painted a light green; a colour which shows the flowers off to the greatest advantage. (*Gard. Chron.*)

For sending dahlias to a distance, a wooden funnel, not unlike a hyacinth glass in shape, has been invented by Mr. Pratt, head gardener to W. Harrison, Esq., Gothic Cottage, Cheshunt. The stalk of the dahlia is thrust down the tube of this funnel, whilst its blossom rests in, and is protected by, the basin of the funnel. Each dahlia bloom has its funnel, and the funnels are inserted in holes made at regular distances in a tin plate, which forms a cover to a shallow box containing moistened moss. So treated, dahlias will remain fresh for a week, and may be sent to any distance. (*Gard. Mag.* v. 526, N.S.)

MODES OF PROPAGATION.

LIKE other tuberous-rooted plants, the dahlia can be propagated in more modes than can other plants of a different form.

By Seed.—Varieties only can be obtained in this mode, for no seedling exactly resembles its parent; though cross-breeding—an intermixture of parents—has great influence in determining the properties or characteristics of the offspring.

Although the parentage has great influence, yet the influence is not paramount, for, as Mr. Wildman has justly observed, so much depends upon accident, or circumstances over which we have no control, that it is difficult to recommend one in particular as a desirable parent to breed from. The amateur should be warned, however, that seeds from thin flowers generally, although their style be good, produce seedlings that end in disappointment. Windsor Rival is an example. Constancy in the parent, Mr. Wildman thinks a matter of little moment, provided defective blooms are immediately removed, and none but the best left for seed. Brightness and clearness of colour are desirable, but no dependence can be placed upon the exact colours that will be produced. If hybridization is resorted to, the best blooms, whether occasional or otherwise, from which

seed might be obtainable should be selected, the colours chosen being distinct and contrasted, and not compound. To those who would not take the trouble to resort to artificial fertilization, which is not needed if a few of the very best varieties, including one or two that seed most freely, should be planted together, apart from all others; the chances then would be far more in favour of valuable seedlings beings engendered.

In making a selection to seed from, the habit of the plant should not be overlooked, there being but little beauty in those flowering beneath the foliage, or of drooping habit, unless the latter are tall growers, such as the Countess of Liverpool. Substance of petal is perhaps the most important point; without this, the colour, or the bloom itself, stands but a very short time. Those varieties possessing this quality in the greatest degree have the most glossy or velvety appearance on the face of the petal. The following would be a good dozen to plant out for this purpose: Marchioness of Cornwallis, Berryer, Beauty of Sussex, Lady St. Maur, Nonpareil, Standard of Perfection, Scarlet Gem, Queen of Sheba, Master George Clayton, Yellow Standard, Princess Radziwill, and Beeswing. Even the finest, and what are termed the most constant flowers, produce blooms that should at once be removed: for this purpose the plants should often be examined, as it is impossible to dis-

tinguish the good from the bad when gathering the seed. And more, the thin blooms possess so much fertilizing matter, from which the bees would injure the whole.

For the production of seed the plants should be devoted to the purpose. All but a few of the uppermost shoots should be pruned away as they appear, and from these, the first flowers, which are rarely good, should be removed. Mr. Paxton adds, that about twenty or thirty flowers should be left, and of these only the finest and best formed be bred from. As soon as each reserved disk begins to expand, it should be covered with thin muslin or gauze to prevent any fecundation by the wind or by bees, from other and undesired varieties. As soon as the florets open, the pollen from the wished-for male parent may be introduced to them during two or three successive days, by the aid of a camel's-hair pencil; this operation to be repeated to each floret as it expands; and the flowers to be kept covered as before directed, until the danger of casual fertilization is passed.

In collecting the seeds, Mr. Paxton recommends that the outer circle of them, and those in the very centre of the disc, should be discarded, the first usually producing single flowers, and the others being imperfectly formed. (*Paxton on the Dahlia*, 68.)

Glory of Plymouth has, to the great astonishment of all who possessed the slightest knowledge of the

parts of the flower, been repeatedly recommended as a good flower from which to save seed. Now, Glory of Plymouth is one of the most double flowers that has ever yet been raised, and, like Globe Crimson, full to the centre; and it might be asserted, without fear of contradiction, that it never has been seeded from, and that it is incapable of bearing seed. This is not a matter of opinion, but one of fact; and any misstatement can be easily disproved.

If *all* the imperfect blooms had been removed from Windsor Rival, not more than one pod of seed could have been obtained in a season.

We have already noticed which seed should be rejected; and we may now observe that, that which is to be preserved should be collected on a fine day, and, after drying thoroughly, be rubbed out from the heads, and kept dry until required for sowing. If kept in the heads they are liable to become mouldy.

The seed ought to be sown about the middle of March on a slight hotbed, to get the plants up early; and which, if properly attended to, will flower the same year; the young plants ought to be pricked out as soon as they are fit—three or four in a No. 48 pot; and as they advance in growth, they may be shifted a month after into small 60 pots, one in each pot; which, after it has grown in strength and size, may be shifted again into a 48, there to remain, till turned into the ground about the third week of May: in

their young and tender state, take care to protect them from cold and frost, so that they receive no check either to retard or spoil their growth. (*Hogg's App.* 196.) Our own practice is to prick the seedlings, singly, into 48s, to remain until fit to be planted out in the open border.

Where seedlings are grown by the florist, it is, generally, in such numbers that protection at night is impossible. The fault of protection being required lies in almost every one sowing too early. It was usual at one time to sow about Christmas; we now sow the first of April, and bloom them a month sooner than formerly, with half the trouble. If planted early, the check is mostly from cutting, cold winds, throwing them back several weeks. Hence the principal object being to keep the plants dwarf.

Mr Sabine, late secretary to the Horticulture Society of London, has left on record suggestions for raising seedlings that are still worthy of attention. The seed, he says, should be gathered from those plants whose colours and character are most likely to please, always taking from the dwarfer ones, where no preference exists on other accounts. Many of the seedlings will follow their parent; therefore, all that are raised will now be new varieties. Double flowering plants are more likely to spring from the seeds of semi-double flowers, than from those of quite single ones; and the chances are, that seeds obtained from

those particular florets of the disc, which have altered their form, may have a greater tendency than others to produce plants with double flowers.

The young plants, pricked out into pots or boxes, and left under cover in warmth until the end of April, may be planted out then where they are to remain, covering each plant for some time with an empty pot at night, to avoid injury from spring frosts. Where single dahlias have been planted the preceding year, many young plants will arise from self-sown seeds; these may remain in their original place, or be removed. The seedlings should be planted in rows three feet apart, and two feet distant from each other in the row; this will allow sufficient space for a person to walk between them to examine the different varieties. Every alternate row may be two feet, if space is an object, thus forming them into beds, leaving plenty of room to look over them twice a week to weed out the single flowers, thus giving sufficient space for the promising plants to bloom in character. They thrive best in rich loam, and require a clear open space to grow in, the shelter of trees or of walls being injurious to them. They seem to suffer in some gardens, if planted often in the same place; therefore, where there is not space to enable the grower to move their quarters in successive years, it will be advisable to add some fresh maiden earth to the soil, when they are to be continued in the same spot. As they are

liable to much damage from the wind, they should be carefully tied to stakes as they grow. The seedling plants thus treated will blow in July, and will continue in perfection till the autumn, but the first frost injures their foliage and the beauty of the flowers, which may, however, be preserved somewhat longer, by moving the smaller plants with balls of earth into large pots, and keeping them under cover in the greenhouse or conservatory.

Until a seedling plant shows its flowers, there are no means of ascertaining its value; the stems of those which produce dark flowers are generally brown, or a dark purple; whilst the paler flowers grow on plants with lighter stems, and the white flowering ones with perfectly green stems; but even these distinctions are not constant. It is worthy of remark, that those seedlings that take the lead and bloom first, seldom, if ever, produce a flower worth preserving; these are from the finest seeds and thinnest blooms; they vegetate first, and keep a-head all through the season, and can easily be distinguished by their tall habit, without side-branches; whereas the late, small plants, that require nursing to make them bloom before the frost arrives, generally produce the best flowers; as it is well known that very few of our best seedlings are ever shown the first season of their blooming. These are from the smallest seeds, and very double flowers. The proper time to judge of the full merit of the

flowers, and consequently to select the plants, is the morning, for the sun injures the brilliancy of the flowers ; and the summer's flowers are much superior in beauty to those produced later in the season ; though in September and October, before any frost comes, the quantity of flowers which are then in blow at once, makes the show at that period the most splendid. (*Hort. Soc. Trans.*)

Mr. Glenny says that as the seedlings come up air should be given to them, to prevent them drawing. As soon as they are large enough, which will be when they have six leaves, they may be planted singly in thumb-pots, and replaced in the frame, or three, four, or more in pots of a larger size ; and by the time the heat of the frame has declined, they will be strong enough to withstand the weather, if they are covered at night, and during frosts.

Those who sow in large quantities will do well to defer sowing until the beginning of April ; inserting the seed in pans or boxes, or broadcast in a frame ; they may then remain until planting time, when they may be planted out according to the convenience of the grower. (*Gard. and Flor.* i. 241.)

For large quantities, it would not do to let them remain in the seed-pan : to do so, it must be small quantities, and sown very thin. A moderate heat should never be used, but always a very strong one, otherwise the most likely and promising seeds would

never make an appearance. The small seeds being from the finest blooms, they perish from the moisture if not sufficient heat to make them germinate at once.

Those who do not possess facilities for potting their seedlings singly, should make a slight hotbed, as heat is required for the first few days only ; on which place a common cucumber-frame, with rich light soil over the manure to the depth of four or five inches, into which the young plants should be placed three to four inches from each other. In a few days the plants will allow of the lights being pulled back, should the weather be fine ; in fact, on all occasions, night or day, when this is the case, the great object being to keep them dwarf ; and a week before planting out for blooming, let the frame be taken away as well. The young plants should be carefully drawn from the seed pans, beginning with the most forward, leaving the late ones for another day, between which a little fine soil should be shaken, and watered with a fine rose before placing the pans again in the hotbed. Plants will continue to make their appearance, which would be lost if Mr. Glenney's plan was adopted, by giving air as soon as the first plants are large enough. If properly done, with moderate attention, stove plants can be produced from four to six inches in height. Such, of course, would bloom in excellent time.

Cuttings taken from the stems growing in the open

air early in summer speedily take root, if planted under a hand-glass, with a moderate bottom-heat.

This mode of propagation is the most important for the dahlia grower's attention. We shall give full directions for the minutiae of the process when detailing the process as applicable to cuttings from forced shoots, and observing that plants obtained from cuttings taken from the root in March are the best and most robust.

Forced Propagation.—The usual, because most productive, mode of propagating the dahlia is by placing its tubers in a good bottom-heat early in the spring, and then planting in pots either the shoots they emit, or cuttings from these.

The editor of "The Gardener and Florist" has observed, very correctly, that there are two or three rules which ought to be attended to in sending out plants thus raised. First, the grower to do any good with them should have them well rooted by the 20th of May. Secondly, they should be plants struck from original shoots of the tuber, and not tops or sides. Thirdly, they should be a week in a cold frame, merely saved from frost, before they are sent out. Nurserymen have a right to do what they like with their own, but all beyond this places the character of a flower in jeopardy. If a florist chooses to run this risk himself, well; but if he lets out dry roots, he is at the mercy of every hungry propagator;

and those who buy dry roots are likely to be more anxious than he who possesses a whole stock, because they know all their neighbours are at work at the same thing, and they endeavour to beat them in number: every extra plant, if only as big as a straw, is so much in their pockets; and they watch every bud, every shoot, every leaf, ready to seize upon the most remote chance of an additional half-guinea. Thus the cultivators of the dahlia have hardly fair play, because they too often pay half-a-guinea for the privilege of farming a dry root for the next season, instead of being enabled to exhibit from a plant the year they buy it. Thus it is that many a flower which has really fair claims is often condemned and discarded the first season. (*Gard. and Flor.* iii. 58.)

Very often, however, amateurs complain without a just cause. Their object in getting plants so early, often, is to take the tops off themselves, and thus to endeavour to grow two instead of one specimen of some favourite, and, consequently, with bad management, neither blooms in time, and the nurseryman is blamed for that with which he had nothing to do.

Forced Shoots.—This, as we have just observed, is the most usual mode of propagation. The tubers, when full grown, would require an enormous pot, unless they were reduced by cutting. Some of the lobes, therefore, may be cut away altogether, others may be shortened, and particularly those which grow

outwards ; so that they can be got into the pot without any soil, it is sufficient.

But many more roots can be placed in a small place without pots, on a tan-pit, or on the front platform of a house, by placing there mould four inches thick, on which putting the roots, and filling all the interstices between the tubers with rich soil.

The crown where the tuber joins the stem should be above the surface of the soil, which should be three-fourths loam and one-fourth sand, and there being first a piece of thin crock, just large enough to cover the hole in the pot, placed over it. The tuber should be carefully potted, and the soil shook or poked between all the lobes of the tuber, that it may be solidly planted ; otherwise, if there be any part hollow under the tuber, and between the lobes, it will soon be a harbour for vermin. It is also necessary to cut away from the tubers every part that is decayed, and any appearance of rot, as, unless cut away before potting, it will spread, and perhaps destroy the whole, before the shoots are long enough to take off. The pots should be placed in a hotbed, or in the stove, or, in the absence of these, in the warmest part of a greenhouse ; but if there be neither stove nor hotbed, it is far better to adopt the mode of parting the roots already treated ; nevertheless, we have propagated in a kitchen, or other warm room, and in a greenhouse.

When the shoots, or any of them, are two inches long, if you do not want a very large increase, you may break them carefully off by pushing them a little on one side, and then back again; but in this operation the pressure must be given quite at the bottom, as well as a little way up; by placing the broad part of the thumb against the side, and pressing down on the crown, as well as against the shoot, it will be found to break out very easily, and strike as readily, if not more readily, than if cut off.

If this be done at the right age of the shoot, there is not the least difficulty about it, and other eyes will shoot round the place it was broken away from. These shoots should be potted, if you have room for them, in small sixty-sized pots, or thumb-pots, as they are called, which is the smallest regular pot that is made, one in a pot; but if, as is frequently the case with amateur growers, you are cramped for room, put five or six in a large-size sixty pot, round the

edges, and place the pots in the hotbed where the tubers are ; but it is far the better way to plant only one in a thumb-pot, from half an inch to an inch down, and close to the side, instead of in the middle, as the pot touching the plant assists the striking, though the shoots that are thus broken out will strike almost anywhere ; of course the operation is the same all through. You must go over the whole of the tubers daily, and take off all that are ready, taking especial care that the number or mark the tuber bears must be attached to all that come off it, which is best done by wooden labels, neatly cut to adapt them to the small and next-sized pots ; two and a half inches long, half an inch broad, and the eighth of an inch thick, pointed, to go into the pot, are the best size, for they will do even for a time after the plant is out in the ground, as well as for all the time it is in the pot. Those shoots, which are put into the hotbed to strike, will root generally in a few days, and begin to grow. They must, however, be watched daily, and the glasses kept all over them, and air must be given by tilting the sashes at the back of the frame, with a stone or piece of wood : this must be done to let out the steam, even when air is not required. The most proper way to strike these cuttings is, to prepare a hotbed on purpose, and that in which the tubers are should be kept for them only. However, it may happen that the grower has but one

frame, and not tubers enough to fill it ; in such case the tubers may be struck in the same frame. In some cases there may be exceptions, but generally speaking there will be three or four shoots come round the place from which the first is taken, so that there will be a constant succession ; the number to take off daily will be increased, and the same process is to be continued to the whole, until the grower finds he has enough, when he may throw away the tubers, or part them into as many pieces as there are shoots or eyes remaining, giving a portion of the tuber to each shoot, and these portions of tubers may be cut shorter to adapt them to as small a pot as possible, but the base of the shoot must be planted under the surface, for a new tuber will be formed from the base of the shoot above the piece of old tuber, and the portion of the old one attached to the shoot will support it until the new one is sufficient to do so ; when planting-time comes, the operation is much the same in all cases. (*Gardener and Florist*, ii. 25.)

Cuttings from forced shoots.—The above directions are chiefly from the pen of Mr. Glenney, and the same good floricultural authority gives the following equally correct information relative to raising plants from cuttings of the shoots so forced. The directions given are equally applicable to cuttings from shoots produced in the open air during summer. The shoots are to be allowed to grow until they have three pair

of leaves, and then to be cut off just under the second pair and above the lowest pair. When one cutting is taken off, plenty of others follow, and these are to be served the same; there must be care used that the cuttings taken off are from three to four inches long and that a pair of leaves are left below, for at every leaf there is an embryo bud which will form a shoot, which shoot will in turn yield a cutting and its two other embryo buds. The cuttings, when taken off, may be struck the same as shoots, but they do not take root so rapidly. It must depend on the room you have whether you will plant a dozen cuttings round a 48-sized pot, or put one cutting each into twelve small ones; in one case but little room is taken up while they are striking, and this is often of importance. When they have struck root they must be potted singly into 60-sized pots, or thumb-pots, kept in heat a few days to establish them, and then replaced under some kind of protection till planting time. (*Gard. and Flor.* ii. 25.)

Mr. Fyffe, gardener at Milton Rectory, Bedfordshire, also recommends this mode of propagation. He says, from the newest sorts which have been purchased from the nursery (and which, in most cases, are cuttings), after they are established, or as soon as you can take a cutting without hurting the plant, take the small side shoots (the more stubbed the better), and pot them, as is commonly done with the shoots

from the roots. These strike well when put in a good strong heat, and, by one or two shiftings, make nice little bulbs before autumn. These dry completely, and allow to remain in the pots during the winter; placing them in a dry situation, not far distant from a flue, so that they may have the benefit of it in damp weather, or when sharp frosts occur. The mould in the pots should be of a light sandy nature: a mixture of leaf-mould and sand, with very little loam, is the safest compound to preserve them in. When the roots are started in the spring, they make excellent plants; and, in most cases, four roots out of six so treated start, and thus secure the rarest sorts from being lost, as is often the case with cuttings the second season. (*Gard. Mag.* iv. 429, N.S.)

Mr. Hogg has some judicious directions for this mode of increasing the dahlia, observing that nothing is more simple and easy. Place, he says, the roots in a hothouse, about the first of March, (many begin in February,) when they readily break, and throw out young shoots, for cuttings, which ought to be taken off when three inches long, and planted in 48 pots, three or four in a pot, or one in a 60, and which may remain in the same place till they take root.

Those who have not this convenience, including most of the private growers, must provide some stable-dung and litter, about the beginning or middle of February, and prepare a hotbed, on which a cu-

cumber frame and lights may be placed, to receive the tubers ; the bed must be covered with six inches of mould, to temper the heat, and keep the steam under. If the tubers have been kept in dry mould in pots, through the winter, either in a greenhouse or cellar, they may remain in those pots, if the crowns of the tubers are not buried, and the pots may be plunged in the earth of the hotbed. If the roots are out of pots, let them be covered with mould, except the crown. The heat will have declined in about three weeks, without fresh lining, when the cuttings will be ready ; so that it will be necessary to have another gentle hotbed to receive them when potted, or else fresh lining must be added to the first one. Let the mould you make use of be sifted fine, and mix with a little leaf-mould, old rotten frame-dung, and fine sand. When the cuttings are planted, water them sparingly for the first week or two, till the wounds be healed over ; shade them from the sun, and cover at night with mats, in case of frost. If any hot steam should by chance rise, raise the lights a little, with a flat bit of tile or oyster shell, to let it escape, to prevent their fogging. After the cuttings are rooted, harden them to the air gradually, and pot them singly, in 60 pots ; as they increase in strength, pot them again in 48 pots, in which they may remain till turned into the ground any time in May or June ; or they may be moved again into larger pots to flower,

as such will form small compact tubers well adapted for package and carriage. These young plants are preferred to the old roots ; and when trained up with single stems, form a fine head, and flower, upon the whole, better. If the ground they are planted in is of rather a free open texture, and dries quickly after rain, it is necessary to put three or four inches of manure, of any kind, on the surface, in form of a circle round the plants, to nourish the roots, to confine the moisture, and prevent evaporation ; the stems and branches being of a brittle and succulent nature, should be well secured with stakes, to prevent their being broken by the wind. (*Hogg's App.* 194.)

By Eyes.—This is the mode whereby most plants of any variety may be obtained within the shortest space of time, though it is seldom practiced, and we do not recommend it. In this we differ, perhaps, from Mr. Glenny, who observes that in this mode there may be half a dozen or more plants made out of one shoot or cutting taken off properly. Suppose there be three pairs of leaves besides the end joint ; the end joint, which will have two leaves, and the heart, may be cut off close to the under leaves, which may be carefully removed, and this forms a cutting ; the stem left is to be split up, each half having its two or three leaves. These are to be cut close under each leaf ; half the portion of split stem, and the whole of

the leaf will remain, and these must be put an inch deep into the soil, each 48-sized pot holding six sets planted against the sides. The bud at the base of each leaf will make a plant if placed in a hotbed, and when they have become well rooted they must be placed in separate pots, and kept growing in heat until they are six or eight inches high, when they may be taken to a cooler frame. (*Gard. and Flor.* ii. 25.)

Grafting.—Plants thus established are not so long-lived as those sustained by their own roots, but it may be adopted advantageously to avoid the chance of losing a seedling, or any scarce variety, and is particularly applicable to those kinds which are horny-rooted and difficult to break, or such as Taylor's *Sultana*, with long stringy tubers, which seldom live through the winter, and to others which break late : to all such this mode is recommended with the great-

est confidence of success. The operation is exceedingly simple (see figure), and may be performed at any time from January to December (provided you have a good growing heat), not only with young green shoots, but with others more advanced, if not hollow or pithy. The usual manner is to take a scion with six or eight leaves, cut it smooth below the joint, take off one of the lower leaves without injuring the eye, and then cut away a portion (half or three-quarters of an inch) of the skin or fleshy part of the wood between each of the lower eyes. Have ready a good sound piece of tuber of the last or present season (if ripe), in which make a slanting longitudinal incision of one or two inches, according to circumstances, and about half an inch wide at the top, gradually tapering off to the bottom, and fix the scion firmly into it. The root should then be planted in a pot, with the grafted part just below the mould, and placed under a bell-glass, or in a warm close frame, but the former is best. In eight or ten days the union will be complete, and air may be gradually given; after a short time you will be able to head it down either for cuttings, if in spring, or grafts for summer and autumn. It is advisable to leave at all times four eyes, to ensure a vigorous growth, and also to shift the plant into a larger pot occasionally. The only difficulty will be in the months of November and December, when the plants are liable to damp

off, because it is necessary to keep them in a green state, and just growing, but nothing more. At the end of January, or whenever you commence propagation, they can be removed to the hotbed or stove; and experience has taught that, with care and attention, they will produce a multitude of cuttings, earlier than can be obtained from ground roots. Many of the Paris florists cultivate them very extensively after this manner for the markets of Peré la Chaise and Montartre. (*Gard. Chron.* 1842, 621.)

Mr. Blake, who, from France, first introduced this mode of propagation, directs the scion to be placed on, instead of in, the tuber. He says that the cutting intended to be the scion should be robust, short-jointed, and having two or more joints or buds; it must also be procured as early in the season as possible. For the stock, select a good tuber of a single variety, taking especial care that it has no buds or eyes, cut off a slice from its upper end, using a very sharp knife, making at the bottom of the part so cut a ledge whereon to rest the scion. This is desirable, because you cannot tongue the scion as you would a woody shoot; and the ledge is useful for keeping the scion in its place whilst it is being tied. Cut the scion sloping to fit the cut on the tuber, and cut it so that a joint may be at its bottom resting on the aforesaid ledge. A union may be effected without the ledge, provided the scion can be well fixed to the

tuber, but the junction will not, in such case, be so neat. The advantage of having a joint at the end of the scion is, that roots are occasionally put from that lower joint. The stem is formed from the upper joint. After the scion has been tied to the tuber with a piece of bast, the whole must be covered over with common grafting clay, and planted in a pot of fine light loam, so deep as to bury half the scion. Place the pot in a gentle heat, such as the front of a cucumber frame; the front affording greater facilities for giving the necessary shading and watering. In three weeks the root may be shifted into a larger pot, if it is too early to move it at once into the border, which will probably be the case; for, supposing the grafting done in March, the plant cannot go out until the end of May. (*Hort. Soc. Trans.* iv. 476.)

For stocks, Mr. Nash recommends dry roots of inferior varieties kept in a dormant state, and the scions to be inserted in a mode differing from either of the preceding. Cut a slit in the tuber two inches long, commencing at the top, and cutting downwards. Shape the lower end of the scion into a wedge form, and insert it in the incision made in the tuber. It may then be treated exactly as recommended by Mr. Blake. (*Gard. Mag.* vii. 38.)

Parting the Roots.—This mode is best for private gardens, where, comparatively, only a few plants are required; and the first object is to obtain speedily

strongly-blooming plants. Writing upon this mode, G. A. Lake, Esq., F.L.S., of Tulse Hill House, gives us the following judicious observations and directions. From cuttings emitted by a single root, under proper treatment, several dozens of young plants may be raised in a short space of time. Consequently, this method is universally adopted by nurserymen; they annually requiring a large stock of young plants for sale; and by individuals anxious to propagate extensively a new variety. But it ought not to be practised by amateurs or others, anxious to obtain fine perfect flowers for exhibition or otherwise, for plants raised from cuttings do not produce equally perfect flowers, in regard to size, form, and fulness, with those produced by plants grown from division of the tubers, the old method of propagating the dahlia. It has been said that plants raised from cuttings, flower more abundantly than those raised by division; but to this we are not prepared to subscribe.

Physiological botany readily accounts for the different results of the two methods. The starch, or feculent matter, stored in the roots, is intended by nature for the nutrition of the animal shoots; not only until the tubers have formed, at the commencement of the vegetating season, the spongioles necessary for the absorption of the required quantity of pabula; but also when the spongioles are unable, from drought, or any other causes, to absorb a suf-

ficiency of nutritient matter, to sustain the rapidity developing and vigorous vegetation.

Plants propagated by cuttings, cannot, of course, absorb the nutriment prepared and stored, during the last season, in the tubers of the mother root ; and are forced to form spongioles and tubers for themselves. But the fecula contained in these latter is not, till towards the end of the year, sufficient in quantity, or sufficiently ripened by the deposition of carbon, to be, perhaps, in any way serviceable. Therefore, in order to secure a good and satisfactory bloom, let the roots be laid, in March, in a damp warm place, such as a forcing-house, gentle hotbed, or even a cellar ; and, when the buds shew themselves, let each root be divided into as many pieces as may be required, retaining a bud to each piece ; and let them be then planted separately in 48-sized pots. The after-treatment is the same as for plants raised from cuttings. (*Gard. Mag.* iv. 178, N.S.)

Upon this mode of propagation, Mr. Glenney remarks, that the tuber of the dahlia has rarely any bud or eye, except where it joins the stem of the last year's plant, the part called the crown ; and it will be frequently found that the tuber is very small at that end. It is, therefore, of the greatest importance that in taking these up, and preserving them for the winter, they should not be broken, twisted, nor bruised at the end which joins the crown ; and if they are

broken, or bruised, or twisted, so as to hang loose, they may as well be taken off at once, for the crown derives no benefit from any that hang loose. These removed, it is often found that the strong ones which are left are too long to pot conveniently ; but they may be shortened without absolute injury, though, as the shortening cannot be of any service beyond the convenience of potting, it should not be done wantonly. In April, let the roots be put in a warm place. Say, for instance, that the cultivator has no frame, or hotbed, or greenhouse, they may be put in a basket or box, in a warm cupboard in the kitchen. If he have a greenhouse, they may be put in the warmest part of that ; or, if he have a garden-frame and glass, let it be converted to a hotbed with a few barrows of hot stable-dung, and two or three inches of soil on it, and the roots be all thrown in there, and be covered up with the glass. If the kitchen or greenhouse be all the convenience possessed, the roots must be brought there early in March. If, on the contrary, there be a hotbed, or the grower has a hothouse, the end of the month will do. The eyes will soon be developed, and begin to shoot : when these are completely shewn, the root may be cut into pieces, care being taken that there is a lobe or portion of the tuber to each eye or shoot. In this, the root is supposed to have an eye to each lobe, but it will not always prove so. With a strong and sharp knife, they

must be so nicely separated, by a careful division of the crown, as to preserve a portion of tuber to each eye or shoot : these portions of the tuber may be shortened so as to go into a 60 or 48-sized pot, and the tuber must be sunk into the pot low enough to cover the part from whence the eye shoots. Thus potted, they may be returned to the place they came from, whether it be hot-house, frame, greenhouse, or kitchen, as near the light as possible ; those in the hotbed or hothouse, to grow until the beginning of May, and then be removed to a cool frame or greenhouse, or room in the dwelling, to get hardened a little before planting out in the ground at the end of the month. Those which, for want of better accommodation, make their growth in a greenhouse or dwelling-house, may remain there, without change, till planting time. But where the quantity is too great to pot off at all before planting, the roots had better be parted as before directed, and then be planted out at once where they are to bloom : in this case it is not necessary to cut away any part of the lobe to shorten it as if for potting, but to plant in holes, with the crown three or four inches below the surface, about the middle of April ; the shoot will then not make its appearance above ground till the middle of May, when it will escape the frost. If, however, any should come up early in May, they must be covered with earth to protect them. These will be quite early enough to

bloom from July till the frost cuts them off. If any come up with two or more shoots, which they will if there be more than one eye to the tuber, all but one should be cut off. The treatment when planted out being the same in all cases. (*Gard. and Florist*, ii. 25.)

To promote this mode of propagation, Mr. Paxton recommends the old entire roots to be placed in a warm situation (a south border is best) and covered, except the crowns, with old bark or light soil; observing to shelter them from frost, and other injuries to which they are liable. When the buds have broken, and are an inch or two in length, the roots may be divided into as many parts as may be desired, taking care that each division has one or more promising buds.

By Autumn Cuttings.—This is a mode of propagation sometimes adopted, but it is open to many objections, and should not be practised except when it is very desirable to increase the numbers of some very rare and valuable variety. The cuttings are taken off as directed in the case of spring cuttings, are preserved in foliage through the winter, and are ready for planting out at the end of May.

SITUATION, SOIL AND MANURES.

SITUATION.—No flower is more impatient of the overshadowing of trees, or of a confined atmosphere, than is the dahlia. It is a native of unshaded plains, and cannot endure being deprived of sunshine, and a free but not boisterous circulation of air.

Mr. Wildman, therefore, does not speak too strongly when he says that, without a free and pure atmosphere, all our labours would be lost; for a dahlia, of all flowers, required a strong air;—and it was in this respect that the metropolitan florists could never compete with their country rivals. In fact, so great was the difference, that many flowers, which with the one are most desirable, are with the other, if not worthless, absolutely useless.

Hard-eyed flowers would never do in London, nor those that were thin and soft in the country: the first requires a strong air and free growth, which the latter cannot bear; as instances, he mentioned Gregory's Regina, as a useful London flower, but worth nothing in the country. Cox's Defiance, though hitherto a favourite in the country, could seldom or ever be exhibited by a London grower. Lady Cooper, again, often beautiful in the country, was useless here, the back petals falling ere the others were

blown. The same with Hudson's Princess Royal. Widnall's Queen, again, was excellent in the one place, —notwithstanding the angularity of petals, which it then in a great degree loses,—has the same defect. Hope was a flower that does well in both places; so also were Unique, Maria, and Catleugh's Eclipse (though uncertain.) Dodd's Prince of Wales, again, is easily bloomed in the neighbourhood of the metropolis, but it is always deep and abruptly sunk in the centre. (*Gard. Chron.* 1843, 87.)

Although the dahlia delights in a free air, yet, also, shelter from high winds is essentially necessary; and, where masses of them are to be planted together, the tallest growers must be planted farthest from the eye, and so as not to overtop the dwarf sorts. M. Fintelman considers the dahlia as a particularly desirable plant for a new garden or shubbery; "because," says he, "it will grow in a rich, moist soil, to the height of 6 ft. in two months, and yearly, afterwards, to the same height in the same soils, provided moisture and manure be abundantly supplied." We notice this as being somewhat at variance with the experience of Mr. Smith, of the Horticultural Society's garden, who states, "that if it is desirable to have dahlias always in one situation, it is necessary to renew the soil, by trenching it deeply the second, and taking it out and replacing it the third and succeeding years." He subjoins, "it will seldom be found advisable to

add manure, fresh soil is all that is necessary." We may observe, in confirmation of M. Fintelman's experience, that dahlias have been grown in the flower-garden at Hylands, on the same soil, without trenching, manure, or fresh soil, for many years; and every year they have attained, though not to the height of 16 ft., yet to as great perfection as the dahlias of the Horticultural Society's garden, or as dahlias do attain in this country. (*Pruss. Hort. Trans.* i.)

Walls facing the south and the east afford excellent protections to dahlias, therefore they may be used as screens for concealing such walls and other fences or unsightly objects, presenting, as they do, at the same time, a beautiful spectacle to the eye by the variety of their colours, from snowy white to the darkest violet, purple blood-red and blackish blood-red, sulphur colour, orange, and scarlet, in all their shades, especially if we can contrive to group the colours in masses.

Although an open situation is essential for the production of the most perfect dahlias, yet very good flowers of this genus may be grown in the borders of shrubberies, and other confined parts of the pleasure-ground. In such situations, however, it is advisable that only the common and inferior sorts should be thus grown.

An excellent situation for planting first-class dahlias, and well-calculated to exhibit their flowers to the

greatest advantage, is an open border, raised at the back and sloping gradually down to the walk in front. By this position the flowers are presented to the eye in a combined broad mass. In these sloping borders the tallest varieties should be planted in the rear, and those of dwarfer habit in the front. (*Paxton on the Dahlia*, 40.)

When raised borders of this description lie parallel on each side of the walk, or have their margins tastefully broken into irregular recesses, of from twelve to three feet in depth, as well as the surface slightly undulated, the beauty and grandeur of these masses, when in flower, defy all attempts at description. Mr. Paxton adds, that not a richer, more brilliant, or more varied display of flowers could be produced from the combined beauty of any other family of plants in the whole field of vegetation.

Soil.—The best of all soils for this, and, we believe, for all other tuberous-rooted plants, is a light, fresh loam, unexhausted by being lately cropped, but without the addition of either fresh animal or vegetable manures.

At the same time, we may observe, that the moister light part of the garden is to be preferred for those dahlias which are liable to have green hard centres, as the Marquis of Aylesbury, Hudson's Princess Royal, &c., and where water can be obtained for them conveniently. Abundance of moisture and rapid

growth causes them to produce more perfect centres. Flowers that usually come thin after their first blossoms, as Lady St. Maur, and Beauty of Sussex, should be planted in the most open situation and in a heavier soil than that best suited to the others.

Mr. Glenny says, that the dahlia grows and blooms to perfection in the soil of a newly turned up meadow, and, generally speaking, flourishes wherever the ground yields a good turnip or cabbage. The space intended to be planted should be trenched, dressed, and thrown up in ridges, from the time the plants are removed in autumn until it is time to replant them in spring. If the soil be light, it is necessary to dress it with good, rich, loam and dung—such as the top spit of a meadow, and the decomposed dung from old hotbeds. If there is any difficulty in dressing the whole of the ground, dig out holes, eighteen inches deep, and three feet diameter, and mix the stuff with the dressing as you return it to the hole. If the soil be on a bed of gravel, it will be absolutely necessary to remove it, at least to the depth above mentioned, and to make good the hole with all soil; if you cannot, with all soil and dressing, for the gravel so near the root would be fatal. (*Gard. and Flor.* i. 21.)

If the preparation of an artificial soil be necessary, the following, employed by the King of Prussia's gardener, M. Fintelman, is as good as any:—One part of the natural sandy soil from his garden, one part of

soft clay, containing 10 per cent. of marl, and one part of rotten wood earth from the carpenter's yard. In this mixture, both young and old plants grow vigorously. Holes, in the situations where dahlias are to be planted, are made 15 in. in diameter and 15 in. in depth, and filled with this soil; and in these holes, so filled, the young plants are turned out, or the old roots inserted. To retain the moisture, and protect the root from excessive heat, the surface is covered with moss. Liquid manure is applied two or three times in the course of the summer. (*Prussian Hort. Trans.* i.)

Manures.—We do not agree in opinion with those who think it necessary to grow dahlias annually on fresh soil. On the contrary, we have grown them for ten or twelve years on the same border with undiminished beauty. All that is necessary is to dress the soil with a little fresh earth, mixed with decaying vegetable matters, such as old leaves, or the bottom of an old wood stack.

At the the Slough Nursery, so celebrated for fine dahlias, they have been grown in the same situation for nearly twenty years, with a little fresh soil added occasionally. The same quarter is under dahlias at the present time, which are growing with undiminished vigour.

Peat is also an excellent article to mix in the soil when the loam is heavy and close, if it can be pro-

cured easily. Let it be distributed all over the piece or border ; if otherwise, mix it in the soil immediately where the plant is to be deposited.

Let it always be kept in mind that it is a very fatal error to imagine that the flowers of the dahlia will be improved or rendered larger by planting in a rich or highly nutritive soil ; for, instead of this desired effect being thus secured, the plants will be induced to produce super-luxuriant shoots and leaves, whilst the flowers either will be reduced both in size and number, or they will be rendered coarse and deficient in beauty of form.

Where the ground is very poor, and has to be made, as it were, there is no addition equal to the soil formed by rotten turfs, cut tolerably thick, which may be estimated at one half loam and half vegetable mould ; but this should be laid on in abundance, and will be far better than dung of any kind. Among the results of planting the dahlia in soil that is too rich, the principal one is that of remarkably vigorous growth, with little bloom, and that little bad. (*Gard. and Flor.* ii. 23.)

Nitrate of soda has been employed with very great improvement to the flowers when, either from the soil being poor, or other cause, the dahlias have appeared weakly. This result of private practice is confirmed by the following results of experiments instituted in the Chiswick Gardens :—

Dahlias were tried with nitrate of soda, each plant having about half an ounce given to it, mixed with water. The plants operated upon became of a fine dark green, more robust and compact in their growth; flowering rather more freely, and earlier than others which had no nitrate; it had no effect on the colour of the flowers. A few of these dahlias were, about three weeks after, again supplied with an additional ounce, mixed with water as before, but without any additional effect being perceptible; nor was any further result obtained when some of the same plants had a third half-ounce administered to them about a month after. (*Proc. Hort. Soc.* 1843, No. 17.)

OPEN-GROUND CULTURE.

THE chief points for consideration in this section of our subject are the planting—staking—pruning—watering—and protection of the plants.

Planting.—The last fortnight of May is the best time for planting out dahlias in the open border, if the season be genial; otherwise, the first or even second week of June is as good a time.

Sink a hole with the spade or trowel at each place where intended, five or six feet apart each way, and

so deep as to place the ball of earth, if growing in pots, or the crown of the tubers, not more than four inches below the surface. Saturate the soil with water all around the tubers, and make a cup or basin on the surface, that they may be the more readily watered, the first few days, until they are established. In about ten days or a fortnight fork all round the plant, earthing up the stems, and sinking a circle all round, at 18 inches distance, making the plant stand, as it were, in a three-feet-in-diameter basin. If the stems are tall enough to bear it, tie them at once to the stakes to protect them, and put the flower-pot, from which each ball is taken, on the top of the stake ; or if you have them, put the pots on the short sticks, that earwigs and other vermin may easily get into them. (*Gard. and Flor.* ii. 28.)

To forward the plants to such stage of growth, those who possess a hothouse should put each plant into a pot of 6 or 8 inches in diameter, with some good rich mould, so as the crown may just appear at the top of the pot ; then place them in the greenhouse, where they will soon make good plants ; and then, at the end of May, or early in June, as before directed, when all danger from frost is over, they may be turned out into holes prepared for them. In this manner, after being so long confined, they will grow most luxuriantly. A common cucumber frame may be successfully used, if a hot-house is not at

command, to advance them in this way. (*Gard. Mag.* v. 142.)

For some time after planting out in the border, if the weather proves dry, it will be necessary to give a little water to the plants every evening, and, after doing so, to protect them from the night reduction of temperature by turning a garden-pot over each. Remove these pots early in the morning, if the weather is genial. During the day, if the sun is sufficiently powerful to cause the leaves of the plants to droop, they may be relieved by shading them with branches of laurel or other evergreens stuck into the soil between them and the sun.

Arrangement.—A light coloured flower should be between two dark coloured flowers, and the latter should preponderate in number. Mr. Sabine correctly observed, also, they look best, in a large mass, unmixed with other plants; in this plan of growing them, some nicety is required in the due distribution of the sorts, so as to have a proper and good mixture of colours, and particular care is necessary to keep the tallest plants either in the centre, or at the back of the clump, according as it is destined to be viewed from one side only, or on every point, and to place the whole so that there shall be no unevenness in the general shape of the entire mass, arising from the irregular arrangement of the individual plants, according to their respective heights. The roots should

be planted about three feet from each other every way ; this distance will keep each sufficiently distinct, and yet so united, that the whole clump will have the appearance of an unbroken wood or forest of dahlias. They look very handsome, if planted in the manner of an avenue, in a straight line on each side of a walk. The earliest flowers will appear in June. (*Hort. Soc. Trans.* iii. 242.)

Mr. Smith, of the Chiswick Gardens, gives the following particulars of an attempt to give the tall-growing kinds a dwarf appearance. After agreeing with the above observations as to the best arrangement of the flowers, he says, the dwarf appearance was effected by pegging down all the young shoots as fast as they grew, until the ground was nearly covered. The shoots were then suffered to grow upright, and the whole became one mass. They flowered extremely well, but rather late in the season, and never had the appearance of being higher than two or three feet and a half. The sorts selected for this experiment were those that flower most abundantly. Large-rooted plants, which produce many stems, are best suited for this purpose, because such sooner fill up the intervening spaces. The dwarf kinds ought always to be planted either by themselves, or in front of the taller ones. When planted in clumps, the effect produced by them is very brilliant. (*Hort. Soc. Trans.* vii. 161.)

This department of dahlia culture is too much neglected by gardeners, who may fill their largest beds with little trouble: all they have to do is to avoid flowers with weak footstalks, and to select those characterized by strength of footstalk; such as Perpetual Grand, Cleopatra, Essex Triumph, Cassandra, &c.

Staking.—When the plants are much exposed, or, indeed, wherever grown, they require to be supported by strong stakes; these should be put in at the time of planting, or shortly afterwards; for, if this work be done later, the roots will be injured by the stakes in driving them down; this hurts the plants when advanced materially, sometimes even killing them. (*Hort. Soc. Trans.* vii. 162.)

They require to be thus supported to keep them from being broken down, not only by high winds, but by the mere weight of their own flowers and foliage during heavy rains. The best fastening for them is the green cord used for window blinds.

Stake them with one large stake, to be permanent, and secure the plant sufficiently loose to allow the stem to swell. Add two small stakes at right-angles, to which the plant must also be secured; this will keep it in a firm position during the worst weather. Add large stakes as the plant advances, and keep the side-branches secured. In this particular, there is generally some neglect; by deferring the tying until it can be done all at once, an unexpected high wind

may strip the plant of half its branches. Do not tie the branches to the stakes in a bunch, but train them out separately, so that the leaves may be well exposed to the light and air. This is essential for the production of fine blooms. (*Turner's Practical Observations on the Dahlia*, 2.)

Sometimes the dahlia is trained in an espalier form, which can only be done by arranging the shoots whilst they are very young. They are trained according to the fan system, the main stems being led out diagonally, and the centre filled by the branches trained horizontally. There should be horizontal bars to form the trellis, as well as upright stakes.

The frequent use of the hoe, not only to destroy weeds, but to loosen the soil's surface, is very beneficial.

Pruning requires to be done very sparingly, and, indeed, is seldom required, unless it is desired to have only a few very fine and perfect flowers. It should be done as soon as the shoots show themselves ; and the lower ones alone should be removed. It is not a good practice to take away the leader. (*Gard. Chron.* 1843, 361.)

Do not allow the plant to become full of small branches, and then removed at once ; all superfluous shoots should be cut away as the plant progresses. It is also injudicious to subject each variety to the same amount of thinning ; for, by such treatment, as much

injury will be done to some kinds, as good to others. Those that are generally too large and coarse must be spared ; when such varieties as require size only should be thinned considerably. No precise rule can be laid down ; and nothing but close observation in this important particular will enable the operator to practice it successfully.

Nearly the same rules apply to disbudding. Those requiring to be reduced in size must be left until a later period of their growth, which will bring the flowers more compact, with smaller petals, and better general form.

We know that we are in opposition to the opinions of some, in thus recommending very slight dahlia pruning, for it is a common notion that, the more you cut away of a dahlia, the more you invigorate the remainder. Nothing can be more erroneous, says Mr. Glenny, than the adoption of such extreme measures. The only pruning a dahlia should have, is the shortening of those branches which impede other branches, and the removal of superfluous flower buds. It is desirable to prune shoots and leaves which are likely to touch a flower, for the friction of a leaf is quite enough to destroy a bloom ; but, beyond the convenience, the shapeliness, and free growth, of all the parts of the plant which require the occasional removal of shoots, nothing more should be done to strengthen any particular bloom than the stopping of any shoot that is

above it, and the removal of some or all of the other flower buds on the branch. (*Gard. and Flor.* ii.)

The plants should be well looked to the first month after planting out; whatever shoots appear below, where the plant is observed to be swelling to the greatest size, should be removed when in a young state.

Judicious pruning and thinning will keep up a fine head of bloom until the frost arrives, let them be as early as they may; but if there is much to cut away at any one time, nothing can be more certain than that the plants have been neglected.

Watering.—In common with other garden plants, rain or pond water is the best for the dahlia; and when once established, it does not require watering more than once a week, even in very dry weather.

Mr. Glenney is of the same opinion on this point of its culture. He says, after a plant is established, water should be given but seldom, and when given let it be as good a soaking of the earth as it would have in three hours' rain; but if this cannot be done, they should be watered all round the plant for eighteen inches, and not on or close to the plant, for water administered close to the stem is baked up by the heat of the surrounding soil, and does not reach the fibres at the extremities; such watering, ten times a day, would not be so effective as a good soaking of the ground once a week: the former checks the progress

of the root, while the latter encourages it. (*Gard. and Flor.* i. 22.)

If, on turning up the earth, it is found moist within two, three, or four inches down, it is better to wait a short time for the chance of rain, than to tamper with the plants by applications of water at the root only. (*Gard. and Flor.* iii. 66.)

Use soft water, if possible. If it is not naturally so, pump it, in the morning, into tubs or tanks, leaving it to the action of the sun and air; to be used in the evening. When the plants have become large, it will be necessary to give them considerable quantities at a time, instead of frequent waterings; but this, of course, will depend upon the state of the weather, soil, &c. On no account neglect giving them a slight sprinkling overhead, through a fine rose or syringe, in dry weather, after the sun has left them; as the dew following this operation, will keep the plants in a wet state until the following morning, which will be a preventive of the thrip, and keep the earwigs from eating the points of the young shoots, which they often do before any blooms appear. The colour and size of the foliage will also soon show the beneficial effects of this practice. (*Turner on the Dahlia*, 5.)

To preserve the moisture in the soil, and to avoid the necessity for watering, some persons mulch their dahlias. There are objections to this, although, with care, it is very effective. First, the litter harbours

vermin, and particularly the earwigs and slugs ; secondly, as the litter keeps the earth moist upon the surface, the roots come actually through the soil, and may be seen at the top on removing the mulching ; and then, if from neglect the surface becomes dry, the plants receive such a check as to take a considerable time to recover, if they ever entirely do so. Notwithstanding these objections, we recommend mulching, for there is no fear of earwigs harbouring in the manure used for mulching, if it is kept properly moist ; and as for slugs, there should be none, for cleanliness will always keep them down.

Tying-up, when the plants are of full stature, requires particular attention : in August, especially, the blooming plants must frequently be looked to, in order to provide any supports that may be required. The greatest care must be observed that the ties are attached firmly to the stem. Dahlias grow fast, and the ties being hid by the foliage, are particularly apt to suffer from oversight on this point. But the greatest injury is to be apprehended from slugs or snails, particularly the black snail (*Limax ater*), which inhabits shady places. A sure preventative to its depredation is a circle of common coal-tar poured round the stem of each plant ; let a small ridge of earth be made within this circle, so that water or liquid manure may be applied when necessary. (*Gard. Journ.* 1845, 488.)

Shelter, both from wind and sun, is essential for the lengthened continuance in beauty of the dahlia blooms when expanded. Mr. Glenny observes, wind and sun are both detrimental ; and the practice of fixing the blooms in the centre of a flat board, and covering them with glass or flower-pots, as they may want light or shade, is becoming general. The more easy way is to use a paper shade for any particular fine blooms ; for, however the flowers may be coaxed and nursed under cover, a stand of blooms grown finely, and merely shaded from the hottest sun, will beat all others in brilliancy, and in standing carriage, and keeping. It is right to go round the plants, and wherever there is a promising bud or bloom, take away all the leaves and shoots that threaten to touch it as they grow ; take off also the adjoining buds, and, if the weather be windy, make it fast to a stick or one of the stakes, that it may not be bruised or frayed ; shade it from intense sunshine, and it will so profit by the air and night dews, as compared with the blooms under pots and glasses, that, if the growth be equal, the blooming will be superior. Nevertheless, people will cover ; and where there is a disposition to a hard eye, this will hardly come out perfect unless it is covered. As the end of September approaches, or as soon as you have done with the bloom, earth up the plants, that when the frost comes it may not reach the crown.

Although shading moderately and judiciously is very essential to enable the flower to attain and to prolong its most perfect beauty, yet the amateur often practises it most mistakingly. By being too anxious he gives himself extra trouble, and at the same time spoils the blooms he so much wishes to preserve, by shading them too long before they are wanted ; shading out of character many of the light flowers, and making all tender, and less able to bear a journey, or exposure when put up for competition. It is requisite to shade some light flowers, and some of the yellows, earlier than others, in order to produce them clear and distinct : when, on the other hand, those with slight tips, or marking, must be deferred ; otherwise, the face of the bloom would be without its characteristic feature, and wear an indistinct blush, instead of the attractive tip or edge.

The time required for shading before a given day when the blooms are wanted, must, in a great measure, depend on the weather. Four or five days will be sufficient for an early show, but, as the season advances, extend the time ; and secure the buds or young blooms likely to be good, from friction against the neighbouring blooms and foliage, by tying them to stakes, or parts of the plant. (*Turner on the Dahlia*, 4.)

The basket-shade, of which the accompanying sketch is a representation, effects all that is necessary

—it shelters the flowers in stormy weather, and it protects them from the scorching midday sun ; these objects are attained without depriving the flower of light and air, which are essential in bringing to perfection the beautiful and intense colours of the dahlia. This protector is made of wicker-work, and consists of an inverted shallow basket, to which is attached a tube made of the same material, through which the dahlia stick is passed, and a peg being inserted between the stick and the tube, it is firmly secured at any height required. It measures 12 inches diameter in the widest part, and is $3\frac{1}{2}$ in depth. From its being made of so light a material, and from its simplicity of construction, it is not easily displaced or put out of order, and the flower not being confined within any thing, is less liable to be damaged by coming in contact with any substance that would injure the petals. It requires to be painted to preserve it from decay, and

if the outside be made green, and the inside white, the appearance of them would not be disagreeable, and the insects lurking inside would be easily perceived. (*Gard. Chron.* 1841, 181.)

Another shade is made of hazel-rods from two feet to seven feet long, according to the height of the flower to be shaded, and about an inch in diameter ; point them at one end, to insert in the ground, and nail on the other a thin piece of deal six or eight inches square.

The board must have a hole in the centre to admit the stem, and by making a cut with a saw from the outside to the hole in the centre, the flower may be slipped through without injury ; and to keep it in its position the branch may be tied to the rod. When the flower is fixed, invert a pot over it sufficiently large to cover it without touching the petals, and the blossom will be protected without injury, and all the beautiful shades of colour preserved which otherwise

would be destroyed by the sun-light, the hole in the bottom of the pot admitting sufficient. The flowers should be placed under the pots when little more than half blown, and in hot dry weather they will be benefited if the pots are taken off, immersed in water, and replaced during the heat of the day. In rainy weather the wet should be excluded by putting a piece of slate over the hole of the pot, which also prevents earwigs from entering; if this were done every night, and the board oiled, these dahlia pests would be almost entirely driven away. To prevent the pot from being blown off, a few nails should be driven round the outside of it, or it may be tied on with matting.* (*Gard Chron.* 1841, 165.)

A third description of shade is made of wire, and covered with paper or canvass, which, to stand the weather well, should be painted. The form of the shade may be as shown in the next diagram: the stick on which it is fixed should have a few holes through it, at different heights, through either of which holes a peg may be thrust, to keep the shade at its proper height, and the stick may be stuck in the ground upright, or sloping, whichever is best adapted for the purpose of keeping off wind, rain, and sun;

* The pot does not require to be made fast, but should be removed as soon as the sun has left the blooms, leaving them exposed for a few hours, if the weather is fine, during the evening.

and the stem of the flower to be preserved should be tied to the stick itself, to keep it steady ; and great care must be taken to cut away any leaves, branches, or buds, that can be blown against the flower by the wind ; for the slightest leaf will fray and spoil a bloom if it rub against it but a few minutes. (*Gard. and Flor.* ii. 29.)

The Norwich growers have two, we may say three, kinds of covers, for they have solid ones made for covering up dark, thus—

They have also glass covers to cover up light ; but an improvement has been adopted—a cover like a flower-pot, without a bottom, that they can cover

either with a glass to let in light, or with a piece of wood to keep it dark.

These have a groove in the bottom to allow the glass or the wood to be cut round to fit it, so that the wind will not blow them away; but an improvement would be to use a cover made of the same material as the pot, so that, without taking the glass off, the flower might be darkened. (*Gard. and Flor.* ii. 29.)

But the most elegant and effectual shelter and shade is that designed by Mr. Turner, florist, of Chalvey, near Slough, the co-editor of this volume. Its other merits are, that it is simple in structure, managed with ease, and adapted for general purposes. It is suitable for all flowers—dahlias, roses, pinks, pansies, &c.—and, from the simplicity of its construction and easy management, it can be placed at

any required height the length of the stalk allows, and that instantly.

The shade is made of tin, $10\frac{1}{2}$ inches in diameter, the band $2\frac{1}{4}$ inches broad, and the crown rises about 3 inches : to the shade is attached a tube, furnished with a spring (fig. A), which, when the stake is introduced, presses it firmly, and keeps the shade at the height required. The spring, in this instance, was made of double tin, but a well-constructed spring would be an improvement, and be less liable to get out of order. A screw would be better than a spring, as represented in the annexed cut. They are painted white inside and out ; but their appearance in a garden would be less objectionable if the outside received a coat of green. When the flowers are tall, the stem should be tied to the stake to prevent injury from motion caused by the wind.

Autumn frosts.—These destroy at once the beauty of the dahlia, not only by injuring its petals, but by breaking down the tissue of its leaves. They are thus rendered more unsightly than ornamental, but, if it be again cultivated the following year, on no account cut down the stems early in the autumn, for this will ensure the rotting of the tubers through the winter, from their immature state, and the superabundance of fluids the roots contain. We have experienced this from those which we have been compelled to cut down in conspicuous situations perishing, whilst

others, which had their injured parts only removed, and their roots protected from heavy rains by having a layer of dry old tan placed round them, were preserved in health. (*Gard. Chron.* 1841, 601.)

Autumn and Winter treatment.—Although it is injurious to remove the stems which have been damaged by frost early in autumn, yet Mr. Sabine was quite correct in directing that, later in that season, soon after the leaves and young branches of the plants have been destroyed by the frost, they should be cut down. Those which are to be left in the ground must be protected by small heaps of dead leaves or tan, and if kept quite free from the attack of frost, or injury by damp, will grow well the next season. But it will, in general, be advisable, especially with the more valuable kinds, to raise them from the ground with their roots and tubers entire, retaining a small portion of the stem attached, to plant them in pots in dry mould or sand, and so keep them in the back of a green-house, or other dry and airy place, free from the access of frost until the spring. The object of the preservation of the roots during the winter, is to keep them sufficiently moist to preserve them plump, and yet not so as to be rotted by damp or spoiled by frost; any situation, therefore, where this can be effected, will answer equally with the more troublesome plan of potting each root: they will do very well if laid on a cool floor in a greenhouse or fruit-room, and may then

be covered with coal-ashes, sand, or other dry substance ; but when thus covered, they should be placed with their crowns erect, and exposed to the air ; the under parts of the roots only should be covered over, exactly as if they were planted. (*Hort. Soc. Trans.*)

Take care that each root has its name attached to it, written on a piece of lead or zinc, and fastened to it by wire.

We are of opinion that the unnatural treatment of dahlia tubers, such as storing them for months quite dry, and then forcing them to produce an unusual amount of shoots in the spring, will by degrees bring upon this flower disease similar to that which ravaged the potato last year. We are sustained in this opinion by the fact, that dahlias out all winter in open beds, without any protection whatever, are much more strong and healthy than those the roots of which have been wintered under cover in pits. And Dr. Lindley goes so far as to state as his opinion, that dahlias might be rendered hardy without much trouble ; and that, by being out all winter, they would be less liable to be affected by frost early in autumn. (*Ibid.* 1844, 336.)

Examine the stored roots during winter, lest any should get mildewed, or begin to decay. If mildewed, they must be wiped clean, and dried, by being laid on the hot water pipes or the flues of the greenhouse, or before a fire ; and those which indicate rot

must have every spot cut away : some may be found shrivelling ; these should be potted directly, but not forced until the usual time. (*Gard. and Flor.* ii. 31.)

Growing Dahlias in dwarf masses.—Mr. Paxton has given the following directions for effecting this growth. Dahlias of a dwarf and peculiarly florescent habit only are suitable for this purpose ; an old kind, called *Ranunculiflora*, is held in estimation. In raising the plants, attention should be directed to prevent them being highly stimulated, or luxuriance of disposition created, it being unfavourable to a satisfactory production of bloom. The soil to grow them in should be selected of a free, rather light, and perhaps slightly poor description. In planting, the plants should be placed so as to be nearly flat on the surface of the soil, and secured with a hooked peg. After management consists in pegging down, as they continue to grow, the leading and main lateral shoots, leaving the remainder to rise and flower unsecured, excepting in case of their extending so much upwards as to break the uniform appearance of the mass ; few shoots require more than once fastening. Care must be taken that in bringing any down they are not broken off or injured ; the surest preventive against which is to go over the plants regularly, fastening the shoots down while they are young. Some branches will require cutting away to prevent the plants crowding upon each other. Managed in accordance with

these directions, the main point, choosing proper kinds, being regarded, a splendid mass of bloom, finely contrasting with dark green stems and foliage, the whole rising from a foot to two feet high, produces in appropriate situations a very fine and unusual effect. (*Paxton's Magazine.*)

Growing in Pots.—To grow dahlias in pots, you must select the dwarfer and more freely flowering kinds, the taller ones being totally unsuited for that purpose. After they are started, and when the shoots are about three or four inches long, pot them singly into small 60s, in any light rich soil; water them freely, and place them in a hotbed, keeping them close for a day or two, and shading them during sunshine. They will (if properly attended to) be rooted in about 10 days, and should then be removed to a much cooler place, and have plenty of air. When well established, shift them into larger pots, and finally, before placing them out of doors, repot them either in 12s or 8s, according to the size of your plants. Top the leading shoots to make them bushy; and when the danger of frost is over, they may be plunged in the open border, which saves much labour in watering; but even then they must be watered copiously in dry weather. They will flower freely all the summer and autumn, although the blooms will not be so fine upon plants grown in pots as upon those in the open border. After flowering, cut the tops off, and

place the pots containing the roots in any dry cellar, or other place where they will be secure from frost during the winter. Young plants struck from cuttings, flower much better in pots than the old roots. (*Gard. Chron.* 1842, 353.)

If early blooms are desired, small roots should be selected, as they are always the most forward in vegetation.

FORCING.

The dahlia bears forcing, without detriment to its peculiar beauties, better than most florist's flowers, and apparently because the rapidity of growth being inimical to the production of the prime organs of reproduction, by so much are friendly to the development of this double flower; those organs being transformed into petals. Be this as it may, the dahlia bears forcing, with little prejudice to its beauty; by potting the tubers in February, and allowing the pots to remain within a frame, or in a cool greenhouse, until June, when they will begin to bloom, and they may be turned out then into the open borders.

To hasten them still more, and further to prolong their endurance, the following system may be adopted; for, although out of doors, the dahlia yields flowers

later and more strongly when not raised in heat ; yet, to have early flowers a hotbed is necessary. Keep the tubers dry and warm, and so soon as they start pot them, leaving the crowns about one inch above the soil. When the shoots are sufficiently long, shift them into large 60-sized pots, and keep them in a room having a south aspect, but without fire. They will flower from early in June until the end of November. (*Gard. Chron.* 1845, 70.)

We have already averted to the groundless condemnation with which the florist is occasionally visited, because the plants furnished by him to the amateur, do not, the first season, appear to have the excellent qualities possessed by its parent. We alluded to the causes of this, and warned our readers against a hasty conclusion ; but since those observations were penned, we have met with the following excellent observations by Dr. Lindley, and as they relate to the consequences of forcing the dahlia, they may be here introduced appropriately.

The dahlia, observes Dr. Lindley, when it first springs from a seed, begins to form a fleshy-fingered root, in which is immediately stored up the organizable matter elaborated by the leaves, and out of which the flower is to be formed. If the summer is long and warm, or circumstances are otherwise favourable, this plant will flower the first year, but feebly, and by no means so well as it will at a later

period. If the fleshy roots are allowed to remain untouched during the first winter, the store of food in them is undiminished ; and the second year the seedling will flower with all the attributes that may be peculiar to it, there being a constant supply of organizable matter from the roots equal to the demand that may be made upon it. But if the root is allowed to go on enlarging and filling with such matter for a third year, the quantity then stored up becomes so great that over-luxuriance is induced, and leaves are produced in more abundance than flowers ; and thus the beauty of the individual is impaired. If, on the other hand, a root well prepared for flowering in the most perfect manner is forced continually to produce shoots which are abstracted for cuttings, it by degrees becomes exhausted of the organizable matter stored up in it, and at last the cuttings contain so little matter of that kind, that they are in the same state as seedling plants—namely, possessed of the power of growth, but destitute of any supply of properly prepared matter out of which perfect flowers can be formed. The consequence of this is, that plants obtained from early cuttings flower well ; from the next supply, worse ; from a third crop, worse still ; and so on. Again, if a dahlia plant struck from a cutting ill-prepared, or even well-prepared, to flower, is itself compelled to furnish other cuttings, it will become exhausted by the cuttings it has yielded, because it

has no supply of organizable matter on which to draw ; and these cuttings will produce plants in a still further stage of debility.

If these statements are rightly understood, they will be found to explain some things that the buyers of dahlias do not seem to be aware of. Many an honest nurseryman has been regarded with suspicion by his customers, because the dahlia plants that he has sold have not answered to sample ; in other words, because they have produced flowers very inferior to those of the variety they have been sold for. And yet, in reality, the vendor has been perfectly correct in his dealing, but the plants he has propagated, have been debilitated by the excessive demand for them. No blame can attach to a nurseryman for this. When a seedling is raised, it is but a single plant ; it gains prizes, is talked of, and gets into request ; and straightway hundreds of plants have to be propagated from that one, in order to meet the sudden demand which, under such circumstances, is sure to arise. Of these plants, a large proportion must necessarily produce bad flowers the first year ; but they will recover their character the second year, and for that second season all reasonable florists will be content to wait. (*Ibid.* 1841, 227.)

DISEASES.

GANGRENE OF THE TUBERS.—This putrefaction of the dahlia tubers, like that which of late years has appeared more generally in those of the potato, appears to be occasioned by unnatural treatment; such as sudden transition from extreme dryness to moistness, from high to lower temperatures, &c.; for it afflicts, chiefly, those tubers which have been kept dry through the winter, and are removed to the open soil in the spring; that have been preternaturally forced to emit shoots, and then are committed to the natural soil and temperatures of our climate. The obvious remedy is more natural treatment.

Instead of keeping the tubers throughout the winter dry, and freely exposed to the air, let them be stored in sand or earth gently moist; or let them remain under an extra depth—about a foot—of soil in the borders where grown.*

Running, or Variableness of Colour.—Dahlias, like many other flowers, are subject to this mutability or uncertainty of colour, and which, in some, is so striking as to have given rise to their specific names. *Gladiolus versicolor* and *Hibiscus mutabilis* are very notable examples of this protean quality.

* This subject is more fully discussed in the first volume of this series, “The Potato; its Culture, &c.”

The cause of this changeability is somewhat uncertain. It is upon the oxygen, combined with their parenchyma, that the colour of a petal depends ; for sulphurous acid (the fume arising from a burning match), which has a most powerful affinity for oxygen, destroys the hue of all coloured flowers, though it leaves that of white flowers unchanged. Mr. Smithson's experiments, and those of M. Schubler, seem to indicate that the colouring matter of flowers and fruits is fundamentally blue—rendered red by acids or the addition of oxygen, or yellow by the presence of an alkali or the subtraction of oxygen. Mr. Smithson says that the colouring matter of the violet is the same in the ruddy tips of the daisy, geranium, blue hyacinth, hollyhock, lavender, and various plums, in the leaves of the red cabbage, and in the rind of the salmon raddish. The acid which causes the red tint seems to be usually the carbonic.

Remarking upon the mutability of colour in some dahlias, a very sensible writer has observed, that such has been the improvement in this flower that it would be almost impossible to recognize Antagonist, Cleopatra, Essex Bride, Marchioness of Ormonde, Lady Antrobus, Admiral Stopford, Beauty of England, or Oakley's Surprise, as descendants from the star-shaped *Dahlia variabilis*, introduced about the year 1800 ; but although the single purple and yellow dahlias of that day have been changed into colours

far more brilliant, and of almost every tint—and although an ideal form of symmetry has been all but obtained, as in Keyne's Standard of Perfection—yet one thing still remains to be accomplished, viz., the fixing of colour in those usually called “fancy” varieties. This has hitherto baffled the skill of the most experienced cultivators. Why purple flowers with white tips should be inconstant, and white flowers with purple tips remain constant, has alike puzzled the botanist and florist; no two persons agree as to the cause, or have been able to suggest a certain remedy. Some attribute it to richness of soil, but proof is not wanting that it occurs very often upon the poorest lands—even upon sand and gravel; others suppose it to be occasioned by a humid atmosphere; but although these may be, and no doubt are, accessories, it must be obvious that they are not the primary cause. In Paris, where the soil is poor, and the summer and autumn usually dry and hot, there is as great an uncertainty as in the comparatively damp atmosphere of Belgium and England; one season they may be seen true, the next selfs. Sometimes a plant will only produce two or three good flowers; at other times one branch will be found bearing variegated flowers; others will come constant here, but bad elsewhere; in fact, so uncertain is the whole race of tipped flowers, that not one single variety can, with any certainty, be guaranteed to keep

its colour. Many of them are said to be constant, but that has only reference to some particular locality. The selfsame kind has been found totally different elsewhere ; for instance, Oakley's Surprise, Modesta, La Lionne, and Beauty of England, are of this number. There is no doubt that the disease may be accelerated by richness of soil and pruning ; on the other hand, it is in some degree prevented by planting pieces of old roots instead of yearly cuttings ; it is true, the flowers will not be so large, but certainly much earlier, very abundant, and more constant. A still better plan is to flower pieces of roots in 12 or 16-sized pots, plunged an inch or two below the surface ; but it is best of all (at least, such is the opinion of French florists) to graft all tipped varieties ; and certainly no one can walk through the Paris markets in June, July, and August, without being struck with the number and beauty of fancy dahlias : you may see hundreds of plants, from 18 inches to 2 feet in height, with blooms as regularly tipped as you could possibly desire. (*Gard. Chron.* 1845, 102.)

We have no doubt ourselves, that the variableness of colour is mainly, if not entirely, dependant upon the fertility of the soil, and that the discordance of opinion arises from a non-attention to the particular colour which is the subject of change. It is a matter of certainty that more colouring matter is developed by plants growing upon a rich soil, than by others of

the same species vegetating at the same time upon a poorer soil; and we have also observed, that fancy dahlias, in which white predominates, growing on a rich soil, have in every flower more of the dark colour peculiar to them, than the specimens growing on less fertile ground. But where the dark colour predominates, this is liable to vary, and to give way to the paler colour associated with it in the florets, when cultivated on a poorer soil.

We have little doubt but that it was a dahlia with white or other light colour predominating, which was the subject of the experiments mentioned by a writer in Hovey's "Magazine of Horticulture." He says, that striped dahlias will be best kept clean by planting them in poor soil, while rich soil invariably runs them. He relates the following experiment with a variety called *Striata formosissima*, in which he is confirmed by Mr. Hovey, who says he has the same results. No. 1, planted in poor, gravelly soil, in an open situation, had all the flowers but two beautifully mottled. No. 2, planted upon a rich, cool, sandy loam, had not one-half of its flowers mottled. No 3, three plants in a soil very highly enriched, had every bloom but one self-coloured.

Change of Form.—Fancy dahlias are quite as liable to this variation as to mutability of colour, and it is quite, if not more singular than variation of colour. The complete difference which is often ob-

servable in the size and form of petal of a tipped flower and a self of the same variety, and not unfrequently upon the same plant, as in Modesta, Nihill Surprise, Striata rosea, Esmeralda, and others, is very striking. So great is the alteration, that no one could know them to be the same sorts, except from their foliage and habit of growth. No one can hesitate from agreeing that this change also arises from the different degrees of fertility possessed by the soils on which they are grown.

INSECTS.

EVERY part of the dahlia is subject to predatory attacks : its tubers to those of the wireworm ; its leaves to those of the aphid and slug ; and its flowers to those of the earwig.

The Wireworm, which attacks the tubers of the dahlia, is the larva of a species of click beetle, spring beetle, or skip jack, bearing the specific entomologica, name of *Elater sputator*. It similarly attacks the potato, carrot, and lettuce.

This insect belongs to the order Coleoptera, or beetles, and to the family of Elateridæ. There are nearly seventy species natives of the British Isles, but there are only six of the *Elater* genus, and to these

Mr. Stephens has applied the generic name of *Cataphagus*, as indicative of the destructively devouring powers of their larvæ. Their ravages are the more to be dreaded because the larva remains in the form popularly known as the wireworm for five years, during the whole of which time it is preying upon the roots of plants.

The four species, the wireworms of which are most injurious to our crops, are the *Elater sputator*, *E. ruficaulis*, *E. obscurus*, and *E. lineatus*. As the habits of these are for the most part similar, we extract the following general description of the click beetles and their larvæ, as given by Mr. Cuthbert Johnson, in the *Farmer's Encyclopædia* :—

Click beetles are readily known by having the sternum produced behind in a strong spine fitted to enter a groove in the abdomen, situated between the intermediate pair of legs. By bringing these parts suddenly into contact, the insects are enabled to spring to some height into the air, and thus recover their natural position when they happen to fall on their backs, which they frequently do when dropping from plants to the ground. A special provision of this kind is rendered necessary in consequence of the shortness and weakness of their legs.

The wireworms have a long, slender, and cylindrical body, covered by a hard crust, which has obtained for them the above name. They are composed of

twelve segments, fitting closely to each other; and are provided with six conical scaly feet, placed in pairs on the three segments next the head. The latter is furnished with short antennæ, palpi, and two strong mandibles or jaws.

To remove the wireworm from a soil, no mode is known but frequently digging it, and picking them out, as their yellow colour renders them easily detected. To prevent their attack upon a crop, mix a little spirit of tar, or a larger quantity of gas-lime, with the soil. It has been stated that growing white mustard drives them away, and it is certainly worth the trial. To entrap them, and tempt them away from a crop they have attacked, bury potatoes in the soil near the crop; and if each potato has a stick thrust through it, this serves as a handle by which it may be taken up, and the wireworms which have penetrated it be destroyed. To decoy them from beds of anemones, ranunculuses, &c., it is said to be a successful plan to grow round the beds an edging of daisies, for the roots of which they have a decided preference.

If a crop be attacked, as the pansy or carnation, our only resource is to bury in the soil other vegetable matters, of which they are fonder than they are of the roots of those flowers. Potatoes, with a string tied round them to mark where they are, and to facilitate their being taken out of the soil in which they

are buried ; and carrots similarly thrust into the earth where the wireworm is ravaging, are successful lures. The vermin prefers these, buries itself in them, and may be easily removed. The roots of the white mustard also are said to drive the wireworm away from the soil on which it is grown. (*Brit. Farm. Mag.*)

Mr. Glenny says, that Mr. May, nurseryman, Tottenham, plants the common daisy round his principal beds, finding the wireworm prefer it to the carrot. (*Gard. Gazette.*)

And Mr. Oram, Edmonton, says that the double daisy is employed by one of his friends, who, in one summer, from a row of daisies three hundred feet long, has taken 2,000 wireworms. (*Gard. Chron.*)

It is not generally known that the mole destroys great numbers of the wireworm, nor that pheasants are very fond of them. Mr. Westwood says, he has heard of instances where the crops of these birds have been found to be filled with wireworms.

Slices of lettuce are found to be more alluring to the wireworm than even slices of potato or of carrot, and more than one respectable testimony can be adduced that if lettuces are grown among dahlias, which they may be, easily, without being seen, the roots of the latter will always remain untouched. Whatever lures are employed these should be examined daily, the wireworms they contain be destroyed, and fresh slices introduced as requisite.

Nitrate of soda has been recommended as offensive to the wireworms, and it may be so, but we can decidedly recommend, both as offensive and destructive to this marauder, the gas lime. This, which is an impure sulphuret of lime, and mixed also with sulphureted hydrogen, is most destructive of insect life. Earl Talbot has tried it extensively on his farms, and reported it to the Royal Agricultural Society as highly efficacious.

The Earwig (Forficula auricularia) is an insect too well known to need particular description ; yet, common as it is, few persons are aware that it is a winged insect, and that all such remedies as tying wool, &c. round the stems of dahlias to prevent its ascent are consequently nugatory. The wings are transparent, of large size, and, when expanded, are shaded like a fan. When not in use, they are folded up beneath two small horny wing-cases, and being quite concealed, to common observers the insect appears wingless. It delights in shady, damp places, and advantage is taken of this to entrap it near the flowers on which it feeds.

The petals of the dahlia are its favourite food ; and Mr. Marnock, in remarking upon this, justly observes, that blooms for ornament and for exhibition are two very different things : the former should be looked for in varieties of small growth, which throw their blossoms well out from the foliage, and are of a decided

colour ; and so long as they are tolerably double, nothing first-rate is required as to form and such like properties. For exhibition the case is different ; no matter what the habit, hardly the colour, so long as the form and arrangement of the flower can be brought near to the ideal of perfection. One of the greatest obstacles in the way of this is the ravages of the earwig, which always is productive of more or less injury. To avoid this, various plans are resorted to for trapping these vermin, such as hanging bean-stalks, or any other hollow tubes, among the plants ; or inverting small pots, partly filled with moss or littery hay, on the stakes, and then examining them every morning, and destroying all the earwigs which have sought concealment there.* But this is not enough : the flowers must be fixed in the centre of, and just above, small temporary tables, and covered completely during night, and partially during the day, by inserting a flower-pot over each ; cotton, wool, or other means being also used to prevent the insect crawling up through the slits made to admit the stalk of the blooms to the centre of the boards. Some use

* That a garden-pot upon the summit of the dahlia stake is not ornamental, must be readily admitted, though its offensiveness is much mitigated if the pot be painted green. Small ornamental cupolas, similarly painted, would be far preferable, and a clumsy attempt at this is represented at p. 190 of the *Gardener's Magazine*, vol. 5, N.S.

glass instead of pots, but generally shade is preferred, though often indulged in to an extreme. However artificial the blooms may be which are thus protected, they are far more beautiful both in sunny and stormy weather than others which are not protected, as well as being preserved from the depredations of the earwigs. (*Gard. Journ.* 1845, 600.)

No labour should be spared by the dahlia grower in searching for these insects, and Mr. Glenney wisely advises that it should be begun from the moment the plants are out. Bean-stalks, small flower-pots, and hollow tubes of any kind, should be placed close to them when they are first planted, and be examined twice or three times a day. One earwig killed early may prevent the plague of a whole brood ; and the cultivator who neglects the precaution because there are so few, little thinks of the consequence of not destroying the heads of families. In short, if this early and apparently troublesome method be not persevered in, ten examinations per day will hardly keep them down when the blooming time arrives. When the plants are small, the pots which the plants come out of should, with a bit of moss put inside, be placed on sticks a foot high ; bean-stalks, in six-inch lengths, should be laid on the ground ; and every earwig trapped at this early period is worth a hundred taken in blooming time. Let a boy go round three or four times a day, if there be any quantity ; but if you can

attend to this work yourself, do it. (*Gard. and Flor.* i. 22.)

Thrips ochraceous is a minute plague, nibbling off the blooms, and leaving white patches and specks; and if they infest a plant before it blooms, its growth is checked, and sometimes past recovery. The thrips being a fly is not easily destroyed; but, as in the case of the aphides on out-of-door plants, they cannot be smoked to death, the next resource is syringing with tobacco-water or soapsuds, or even clear water; for many will be destroyed every time, and continual disturbance has a good benefit, even if they are not killed. (*Gard. and Flor.* i. 22.)

The *Thrips ochraceous* is of the same genus, and very much resembles that titillating insect (*Thrips physapus*) so tormenting to the face in summer. It is narrow and linear, of a bright and deep ochreous colour, the eyes are black, the horns appear to be only six-jointed, and brownish at the tips; it has three ocelli in the crown; the body is hairy, the tip pointed and bristly; the wings are shorter than the body in the male, lying parallel on the back when at rest, narrow, especially the under ones, and fringed; the hairs longest beneath and at the point; tips of feet dusky. (*Gard. Chron.*)

USES.

Every part of the dahlia may be usefully employed in times of need.

Stalks and Leaves.—In Prussia, these have been found to make a wholesome food for pigs, sheep, and asses; they are also eaten by deer and cows, and they are, in a dried state, readily eaten by lambs and young goats. When cultivated as cattle food, the stalks may be cut over two or three times in one season. The tubers may be eaten both by men and cattle, but they are neither so agreeable nor so nourishing as those of the potato. (*Prussian Hort. Trans.* i.)

The Tubers.—The reason of these not being palatable, though those of the congenous plant, the Jerusalem Artichoke, are generally relished, arises from the former containing a bitter principle of so acrid a nature, that its general employment as food has always been hitherto despaired of. The *Journal de Châmbéry* states, however, that this bitter principle is removed by boiling, much in the same manner as the potato is cooked. If this be so—but we have no experience on the point—the dahlia root might, in some measure, be substituted for the potato during times of scarcity. (*Medical Times.*)

Flowers.—We have seen a specimen of a kind of

carmine, very brilliant and very pure, obtained by Mr. Rupprecht, of Vienna, from the florets of the dahlia. He regards it as a valuable product, and says that he has obtained 235lbs. of pigment from 200 square fathoms of land. It has already been applied to staining confectionery, artificial flowers, fancy paper and leather, and in the preparation of rouge. It seems, however, too fleeting for silks and cottons. Only the deep clear purple dahlias will yield it. (*Gard. Chron.* 1841, 119.)

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