CHRYZOPHORA

ovary 3-celled, 3-ovuled.—Nine, species chiefly of Old World deserts. C. tinctoria, Juss. (Croton tinctoria, Linn.), TURNSOLE, a Medit. annual, formerly used for its blue dye, is listed in some European catalogues.

CHRYSLIDOCARPUS (Greek for golden fruit). Pálmaceae, tribe Areceae. Spineless stoloniferous fan palms, with medium fasciculate ringed stems.

Leaves pinnati-compound, long-acuminate; segms. about 100, bifold at the apex, the lateral nerves remote from the midrib; fr. usually violet or almost black.—Species 1, which is a popular florist’s plant. Madagascar.

CHRYZANTHEMUM (Greek, golden flower). Including Pyrethrum. Compositae. Plate XXX. A diverse group of herbaceous and sub-shrubby plants, mostly hardy, and typically with white or yellow single flowers, but the more important kinds greatly modified in form and color, grown in the open or flowered under glass in fall.

Annual or perennial herbs, sometimes partly woody, glabrous or loosely pubescent or rarely viscid, usually heavy-scented: lvs. alternate, various, from nearly or quite entire to much dissected: heads many-fl, terminating long peduncles disposed in corymbose clusters, radiate (rays sometimes wanting); disk-fls. and mostly fertile; ray-fls. pistillate, mostly fertile, the ray white, yellow, rose-colored, toothed or entire; receptacle naked, flat or convex; involucr-scales imbricated and appressed, mostly in several series, the margins usually scarious: achene of disk- and ray-fls. similar, striate or angled or terete or more or less ribbed, those of the ray-fls. often 3-angled; pappus 0, or a scale-like cup or raised border.—Probably nearly 150 recognizable species, in temperate and boreal regions in many parts of the globe, but mostly in the Old World.

The genus Chrysanthemum, as now accepted by botanists, includes many diverse species so far as general appearance is concerned, but nevertheless well agreeing within themselves in systematic marks and by those same marks being separated from related groups. The marks are in large part set forth in the preceding paragraph. Bentham and Hooker make two sub-groups (of which about six include the garden forms), based chiefly on the way in which the seeds are ribbed, cornered, or winged, and the form of the pappus. The garden pyrethrums cannot be kept distinct from chrysanthemums by garden characters. The garden conception of Pyrethrum is a group of hardy herbaceous plants with mostly single flowers, as opposed to the florists’ or autumn chrysanthemums, which reach perfection only under glass, and the familiar annual kinds which are commonly called summer chrysanthemums. When the gardener speaks of pyrethrums, he usually means P. roseum. Many of the species described below have been called pyrethrums at various times, but they all have the same specific name under the genus Chrysanthemum, except the most important of all garden pyrethrums, viz., P. roseum, which is C. coccineum. The feverfew and golden feather are still sold as pyrethrums, and there are other garden species of lesser importance. The botanical conception of Pyr-

CHRYZANTHEMUM

ephyrum is variously defined; the presence of a rather marked pappus-border on the achene is one of the distinctions; the pyrethrums are mostly plants with large and broad heads either solitary or in loose corymbose clusters, the rays usually conspicuous and commonly not yellow, and the fruits five- to ten-ribbed. Hoffmann, in Engler & Prantl “Natrülicher Pflanzenfamilien,” adopts eight sections, one of them being Tanacetum (tansy) which most botanists prefer to keep distinct.

Although the genus is large and widespread, the number of plants of interest to the cultivator is relatively few. Of course the common garden chrysanthemum, derived apparently from two species, is the most useful. The insect powder known as “pyrethrum,” is produced from the dried flowers of C. cinerariaefolium and C. coccineum. The former species grows wild in Dalmatia, a long narrow mountainous tract of the Austrian empire. “Dalmatian insect powder” is one of the commonest insecticides and pests. C. cinerariaefolium is largely cultivated in France. C. coccineum is cultivated in California, and the product is known as buehch.

There are over one hundred books about the garden chrysanthemum, and its magazine literature is probably exceeded in bulk only by that of the rose. It is the flower of the East, as the rose is the flower of the West.
Aside from oriental literature, there were eighty-three books mentioned by C. Harman Payne in the Catalogue of the National Chrysanthemum Society for 1896. Most of these are cheap cultural guides, circulated by the dealers. The botany of the two common species has been monographed by W. B. Hemley in the Gardeners' Chronicle, series III, vol. 6, pp. 521, 555, 585, 652, and in the Journal of the Royal Horticultural Society, vol. 12, part I. The great repositories of information regarding the history of the chrysanthemum, from the garden point of view, are the scattered writings of C. Harman Payne, his "Short History of the Chrysanthemum," London, 1883, and the older books of F. W. Burbidge and John Salter. For information about varieties, see the Catalogues of the Chrysanthemum Society (England) and the Liste Description, and supplements thereto, by O. Meulenaere, Ghent, Belgium. There are a number of rather expensive art works, among which one of the most delightful is the "Golden Flower of Chrysanthemum," edited by F. Schuyler Mathews, Prang, Boston, 1890. "Chrysanthemum Culture for America," by James Morton Clarksville, Tenn., published in New York in 1891, was the first authentic American work. Within the past few years have appeared "The Chrysanthemum," (3), by Arthur Herrington, "Smith's Chrysanthemum Manual," by Elmer D. Smith, and recently "Chrysanthemums and How to Grow Them," by L. L. Powell.

Aside from the florist's chrysanthemum (C. hortorum), no particular skill is required in the growing of these plants, although great perfection is attained by some gardeners in the handling of individual plants of the marguerites (C. frutescens). The hardy border perennial chrysanthemums may be either small-flowered rugged forms of C. hortorum, as the "hardy pompoms" and also the "artemisias" of old gardens, or they may be other species. Some of these other species are the "pyrethrums" of gardens, and some (as the C. maritimum and C. uliginosum class) are the "moon daisies" and "moonpenny daisies" of the hardy perennial plantation. Some of the very dwarf tufted kinds (as C. Thchitachevii) make excellent edging plants. The moon daisies deserve to be better known for mass planting and bold lines when a great display of heavy, white bloom is wanted. Most of them bloom the first season from early-so-so seed. The Shasta daisy and its derivatives are of the moon daisy group. They all profit by a covering of coarse mulch in the fall. See Pyrethrum and Marguerite.

The annual chrysanthemums are easily grown flower-garden subjects, suitable for a bold late display in places where delicate and soft effects are not desired.

### C. carinatum, C. coronarium and C. seteum

These are the common sources of these annuems. They are hardy and rugged; and they need much room.

#### INDEX.

1. carinatum, Schousb. (C. tricolor, Andr. C. mattri-carinates, Hort.). Fig. 927. Glabrous annual, 2–3 ft. high much branched; lvs. rather fleshy, pinna-tifted; fls. in solitary heads which are nearly 2 in. across, with typically white rays and a yellow ring at the base; involucral bracts carinate (keeled). Summer. The two colors, together with the dark purple disk, gave rise to the name "tricolor." The typical form, intro-duced into England from Morocco in 1798, was pictured in F.S. 11:1099). In 1858 shades of red in the rays appeared in a strain intro. by F. K. Burridge, of Colchester, Eng., and known as C. Burridgeanum, Hort. (see B.M. 5095, which shows a ring of red on the rays, and a single for color only of the brilliant and varied fl. and F.S. 13:1313, which also shows C. venustum, Hort., in which the rays are entirely red, except the original yellow circle at the base). G. 2:307. G.W. 24:675. C. annulatum, Hort., is a name for the kinds with circular bands of red, maroon, or purple. R.H. 1889:450. C. Diannetti, Hort., is another seed-grower's strain. There are full double forms in yellow margined red, and white marginred, the fls. 3 in. across (see R.H. 1874:410), under many names. See, also, G. 26, p. 440; 10, p. 213; 21:22. R.H. 1874, p. 412. S.H. 2:477. G.W. 14, p. 99.—The commonest and greatest of annual chrysanthemums, distinguished by the keeled or ridged scalps of involucre and the dark purple disk.

2. coronarium, Linn. (Anthemis coronaria, Hort.), Annual, 3–4 ft.; lvs. bipinnately parted, somewhat clasping or eared at the base, glabrous, the segms. closer together than in C. carinatum: involucral scales broad, scarious; rays lemon-colored or nearly white. July–Sept. Medit. 1:240, 40. G.C. II. 19:541. — The full double forms, with rays reflexed and imbricated, are more popular than the single forms. This and C. carinatum are the common "summer chrysanthemums." This is common in old gardens, and is also somewhat used for bedding and for pot culture.

3. seteum, Linn. CORN MAHGOID. Annual, 1–1½ ft.; lvs. sparse, clasping, oblong to oblancoate, variable, the lower petiolar and the upper clasping; rays coarse or fine, deep or shallow, but usually only coarsely serrat, with few and distant teeth, the lower ones less cut: bracts of involucr broad, obtuse; rays obovate and emarginate, golden yellow. June–Aug. Eu., N. Afr., W. Asia. Escaped in waste places. G. 18, p. 196. R.H. 1886, pp. 448, 449. Var. grandiflorum, Hort., is a larger-fl. form of this weed, which is com-
mon in the English grain fields. Forms of the plant are cult.; the var. Cloth of Gold, J.H. III. 12:445, is one of the best. Var. pumilum, Hort., very compact, 8 in. high. This species is much less popular than P. carinatum and P. coronarium. It is forced to a slight extent for winter bloom.

4. multicaule, Desf. Glabrous and glaucous annual, 6-12 in. high: sts. numerous, simple or branched, stout, terete: lvs. fleshy, variable, usually linear-spatulate, 1-3 in. long and 3/4-3/4 in. broad, very coarsely toothed or lobed, sometimes shorter, with few narrow-linear, acute, entire segms. about 1 line broad: rays much shorter and rounder than in C. segetum, golden yellow. Algeria. B.M. 6930.—Rarer in cult. than the last. Said to be useless as a cut-fl.

AA. Plant perennial.

b. The florist's chrysanthemum, and wild progenitors or near relatives, grown as pot or bench subjects because the seasons are not long enough, in the N., for full maturity in the open: rays of many forms and colors in cult.; heads often double: lvs. usually lobed or strongly notched.

5. morifolium, Ram. (C. sinense, Sabine). Fig. 928. Perennial, one of the sources (with C. indicum) of the large florist's chrysanthemums: wild plant shrubby, erect and rigid, 2-3 ft., branching, few-lvd.: lvs. thick and stiff, 2 in. long, densely white-tomentose beneath, variable in shape from ovate to lanceolate, cuneate at base, margin entire or coarsely toothed: outer bracts of involucre thick, linear, acute, white-tomentose; fl.-heads small, with yellow disk and white rays somewhat exceeding the disk. China. G.C. III. 31:302 (adapted in Fig. 928). Var. gracile, Hemsl. Lvs. thin or only moderately thick, pinnately lobed or pinnately lobed, dentate, the teeth often mucronate: outer involucral bracts herbaceous, linear and acute, varying in pubescence; rays white, pink or lilac, equaling or exceeding the disk. China, Mongolia, Japan.

6. indicum, Linn. Fig. 929. Much like the last, but lvs. thin and flaccid, pinnately parted, with acute or mucronate teeth: outer involucral bracts broad and scarious except the herbaceous midnerv; rays yellow, shorter than diam. of the disk. China and Japan. B.M. 7874. G.C. III. 8:505; 22:342; 31:303 (adapted in Fig. 929).—This species is not native to India, and therefore Linnaeus' name is inappropriate. Abroad, C. indicum is often used in a wide sense, to include C. morifolium. In recent years, both C. morifolium and C. indicum have been grown in England from wild stock, and from such studies of them the present descriptions and figures are drawn. From these plants it is supposed, by endless variation and by hybridization, the highly developed glasshouse or florist's chrysanthemums have come, a group that may be distinguished as C. hortorum, Figs. 938-50.

7. ornatum, Hemsl. (C. margaritatum, Hort.). Allied to the above two species, and perhaps a form of C. morifolium: bushy plant, 3-4 ft.: lvs. pinnately lobed, ovate in outline, white-tomentose beneath and on the margin, 1 1/2-2 in. long: fl.-heads loosely corymbose, 2 in. or less across, the disk yellow and rays white and broad; bracts of involucre in about 3 series, all similar, white in center, purple-brown on margin: achenes small, oblique, glabrous. B.M. 7965. G.C. III. 35:51, G.C. VII, p. 53; 75, p. 90.—A recent introduction; grows well in the open in England, but does not bloom unless taken indoors.

BB. The garden pyrethrums and others; heads usually not highly doubled and modified.

c. Lvs. cut to the midrib or nearly so.

d. Heads borne in corymbs, i.e. flat-topped, dense clusters.

e. Rays yellow.

8. achilleaformium, DC. (Achillea aurea, Lam.). Perennial, 2 ft.: st. usually unbranched, except along the creeping and rooting base: sts. and lvs. covered with fine soft grayish white hairs, oblong in outline, about 1 in. long, 3/4 in. wide, finely cut: rays 7-8, short, a little longer than the involucre. Siberia, Caucasus. Rare in cult. Less popular than the achilleas, with larger fl.-clusters.

ee. Rays white.

9. corymbosum, Linn. (Pyrethrum corymbosum, Wild.). Robust perennial, 1-4 ft.: st. branched at the apex: lvs. sometimes 6 in. long, 3 in. wide, widest at middle and tapering both ways, cut to the very midrib, the segms. alternating along the midrib. Eu., N. Afr., Caucasus. G.C. II. 20:201.—Rare in cult. Segms. may be coarsely or finely cut, and lvs. glabrous or vil- lous beneath.
10. _Parthenium_, Pers. (_Pyréthrum_ _Parthenium_, Smith. _Parthenium Maticária_, Guehd.). _FEVERFOW_. Fig. 930. Glabrous strong-scented perennial, 1–3 ft., much branched in the taller forms; lvs. ovate or oblong-ovate in outline, pinnatisect or bi-pinnatisect, smooth or lightly pubescent; segms. oblong or elliptic-oblong, pinnatifid or cut, the uppermost more or less confluent: fl.-heads small, many, stalked, corymbose; disk yellow; rays white, oblong, equaling or exceeding the disk. Eq. to the Caucasus.—Some authors regard this as one widely variable species; others make at least two species, one of them (_C. procumbens_, Vent.) being the Caucasian form, distinguished by more deeply cut lvs., longer-peduncled heads, and rays longer than the disk rather than equaling it (as in _C. Parthenium_ type).—There are double-fl., and also discoid forms. Var. _aureum_, Hort. (_P. aureum_, Hort.), is the Golden Feather commonly used for carpet-bedding. It has yellow foliage, which becomes green later in the season, especially if fls. are allowed to form. It is used for edgings and cover. Var. _aureum_ _crispum_, Hort., is dwarf, compact, with foliage curled like parsley. Var. _selaginoides_, and var. _laciniatum_, Hort., are distinct horticultural forms. Var. _glaucescens_, Hort., has dusty white foliage, and does not bloom until the second year. Intro. by Damman & Co., 1895. All these varieties are prop. by seeds. The feverfew is common about old yards, and is much employed in home gardens as edging. In its undeveloped and prevailing forms, it is one of the "old-fashioned" plants.

**DD. Heads borne singly on the branches or sts. (or at least not definitely clustered).**

**f. Height less than 1 ft.**

11. _Tchiháctchwilii_, Hort. (_C. Tchiháctchefti_, Hort.). _TURFING DAISY_. Densely tufted perennial for carpet- and dry, waste places; height 2–9 in.: sts. very numerous, rooting at the base; foliage handsome dark green, finely cut, the segms. linear, persisting into winter: fl.-heads solitary on axillary peduncles, borne profusely for several weeks; rays white, disk yellow. Asia Minor. R.H. 1869, p. 380, desc., and 1897, p. 470. Gn. 26, p. 443. —Prop. by division of roots or simply by cutting the rooted sts., but chiefly by seeds. Highly recommended abroad for spring and early summer bloom in edgings and low formal plantings. Said to thrive in dry places and under trees.

**EE. Height more than 1 ft.**

7. _frutescens_, Linn. _MARGUERITE. PARIS DAISY_. Figs. 931, 932. Usually glabrous, 3 ft. high, perennial; lvs. fleshy, green; heads numerous, always single; rays typically white, with a lemon-colored (never pure yellow or golden) form. Canaries. G.C. II. 13:561; III. 35:216. Gn. 12, p. 255; 17, p. 5; 26, p. 445; 70, p. 310. —Intro. into England. 1869. This is the popular florists’ Marguerite, which can be had in flower the year round, but is especially grown for winter bloom. Var. _grandiflorum_, Hort., is the large-fl. prevailing form. The lemon-colored form seems to have originated about 1880. Under this name an entirely distinct species has also been passing, yet it has never been advertised separately in the American trade. See No. 13.

**g. Foliage not glaucous.**

12. _anethifólium_, Brousse. (_C. fanéculaceum_, Steud. _P. fanéculaceum_ var _bipinnatifidum_, DC.). _GLAU- COUS MARGUERITE_. Fig. 932. Perennial: rarer in cult. than _C. frutescens_ (which see), but distinguished by its glaucous hue, and by the way in which the lvs. are cut. The segms. are narrower, more deeply cut, and more distant than in No. 12. The lvs. are shorter petiolated. Canaries. —This species is doubtless cult. in American greenhouses as _C. frutescens_. A lemon-fl. form is shown in R.H. 1845:61 but called _C. frutescens_.

930. Chrysanthemum _Parthenium_._ Feverfew._ (×1/2)

931. Chrysanthemum _frutescens_. The Marguerite or Paris daisy. (×1/2)
**CHRYSANTHEMUM**

**FF.** Group of hardy outdoor herbs: st., usually unbranched; rays white or red, never yellow.

a. Foliage not glaucous: fls. sometimes double.

14. **coccineum**, Willd. (Pyrethrum roseum, Bieb., not Web. & Mohr. P. hybrideum, Hort.). Fig. 933. Glabrous perennial, 1-2 ft. high; st. usually unbranched,

rarely branched at the top: lvs. thin, dark green, or in dried specimens dark brown: involucral scales with a brown margin; rays white or red in such shades as pink, carmine, rose, lilac, and crimson, and sometimes tipped yellow, but never wholly yellow. Caucasus, Persia. F.S. 9:917. Gn. 26, pp. 440, 443. Cng. 2:7; 5:300. R.H. 1897, p. 521. Not B.M. 1880, which is C. coronopifolium. The first picture of a full double form is R. H. 1864:71. —This species is the most important and variable of all the hardy herbaceous kinds. There have been perhaps 700 named horticultural varieties. There is an anemone-fl. form with a high disk. The species is also cult. in Calif. and France for insect powder. C. atroangicinum, Hort., is said to be a good horticultural variety with dark crimson fls. The C. roseum of Weber & Mohr being a tenable name, Hoffmann proposes Ascherson’s name, C. Marschallii, for the P. roseum of Bieberstein; but Wildenow’s C. coccineum is here retained.


cc. Lvs. not cut to the midrib, pinnatifid or coarsely toothed (except perhaps in No. 92).

d. Heads borne in clusters, mostly flat-topped

16. **Balsamita**, Linn. (Tanacetum Balsamita, Linn. Pyrethrum Balsamita, Willd. Balsamita vulgaris, Willd.). COSTMARY. Mint ERANJUM. Sometimes erroneously called "lavender," from its sweet agreeable odor. Tall and stout perennial: lvs. sweet-scented, oval or oblong, obtuse, margined with blunt or sharp teeth, lower ones petioled, upper ones almost sessile, the largest lvs. 5-11 in. long, 1½-2 in. wide: pappus a short crown. W. Asia.—Typically with short white rays, but when they are absent the plant is var. tana-

cetoides, Boiss. Fig. 934. Rayless. This has escaped in a few places from old gardens: it seems to be the prevailing garden form.

**CHrysanthemum**

**DD.** Heads borne singly on the branches or st., or at least not in definite clusters; rays large, white.

17. **lacustre**, Brodt. (C. latifolium, DC.). Fig. 935. Perennial; endlessly confused with C. maximum in gardens, and the two species are very variable and difficult to distinguish; the fls. can hardly be told apart. C. lacustre is a taller and more vigorous plant, and sometimes it is branched at the top, bearing 3 heads, while C. maximum is always 1-headed, and the lvs. in that species are much narrower. Height 3-6 ft.: st. sparsely branched: lvs. partly clasping, ovate-lanceolate, with coarse, hard teeth: rays about 1 in. long; pappus of the ray 2-3-eared. Portugal, along rivers, swamps and lakes. R.H. 1857, p. 456.

18. **maximum**, Ramond. Fig. 936. This perennial species has narrower lvs. than C. lacustre, and they are narrowed at the base: height 1 ft.: st. more angled than the above, simple or branched at the very base, always 1-headed and leafless for 3-4 in. below the head: lower lvs. petioled, wedge-shaped at the base, or long-oblancoolate; the upper lvs. becoming few, lanceolate but usually not very prominently pointet, the teeth not very large or striking: pappus none; involucral scales narrower and longer, whitish-transparent at the margin, while those of C. lacustre are broader, more rounded at the apex, and with a light brown scarios margin. Pyrenees. J.H. III. 5:251. Gn. 26, p. 437; 73, p. 567. G. 3:445. G.M. 46:676. Var. Robin-
sonii, Hort., has finely cut or fringed rays, giving the bloom the appearance of a Japanese chrysanthemum. R. H. 1904:515. Var. **Davidsii**, Hort., has stps. of great length, suitable for cutting. Var. **filiforme**, Hort., has deeply serrate long and drooping rays. There are many other forms, differing in time of bloom as well as in habit and in form of fl. The **Shasta daisy** (said to be a
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hybrid) is an early-flowering very floriferous race, with several strains of fls., mostly large and pure white, although in one form the buds are reported as lemon-yellow but opening white; various sub-varieties are now offered. It is a good summer and autumn bloomer, and usually hardy in the northeastern states.


—It blooms the first year from seed or division, and has been forced in Easter somewhat as Hydrangea paniculata can be treated. Excellent for cut-fls. The blossoms should be cut soon after opening, as the disks darken with age. The plant needs a rich moist soil; it deserves a greater popularity.

20. Leucanthemum, Linn. (Leucanthemum vulgare, Lam.). WHITEWEED. OX-EYE DAISY. Fig. 937. Glabrous perennial erect weed, 1-2 ft. high: root-lvs. long-petioled, with a large oval blade and coarse, rounded notches; st.-lvs. lanceolate, becoming narrower toward the top, serrate, with few distant and sharper teeth. (Var. pinnatifidum, Lec. & Lam., has more divided lvs.); head terminal, showy white. June, July, Eu., N. Asia; Gn. 70, p. 176.

—One of the commonest weeds in the eastern states, being characteristic of worn-out meadows. The daisies are not cult., but they are often gathered for decoration, and make excellent cut-fls. The plant is very variable, and forms adapted to fl.-garden uses will probably be developed. Rayless plants are sometimes found.

21. nipporicum, Hort. (Leucanthemum nipponicum, Franch.) Differing from others of this set in being shrubby at base and lvs. broadest above the middle: to 2 ft., the st. strong, simple, few-fl.d.: lvs. thick, oblong-spataulate to ob-lanceolate, sessile, irregularly denticulate but entire at base; 3-4 in. long, pale beneath: fl.-heads 2-3½ in. across, with a hemispherical involucre of oval obtuse bracts; rays bright white, linear, minutely 5-toothed; disk pale greenish yellow. Japan. B.M. 7660. R.H. 1905, p. 47. F. E. 20: 434.—Hardy in the N., in the root, but the sts. killed down by frost; has the general appearance of C. lacustre. A beautiful large-fl.fld. species, producing its large fruits in late Aug.

22. arcticum, Linn. Low perennial, 3-15 in., glabrous or nearly so: lvs. cuneate, long-tapering at base, toothed or cut at the apex, sometimes 3-5-lobed, the uppermost ones small and very narrow and nearly entire: involucre-bracts broad and brown-margined; rays clear white, about 1 in. long; pappus wanting. Arctic Eu., Asia and Amer.

—An attractive very hardy species, making a clump of dark green foliage and producing in autumn many large white fls., sometimes tinged lilac or rose.

C. coronopifolium, Wild. = C. roseum. — C. grandiflorum, f. (Flugel grandiflorus, f.Lher.), Stout, perennial of Algeria, 2-3 ft.: lvs. oblong to linear-oblong, often lyrate, coarsely toothed; fl.-heads large, solitary, ray-yellow, pinnatifid; disk C. coronopifolium, Wild. Shrubby, smooth, from the Canaries, with cuneate lobed lvs., the parts lanceolate or linear and toothed or entire; fl.-heads solitary, the rays white and disk yellow; allied to C. frutescens; variable.—C. involutum, Linn. = Matarica involuta. — C. macrophyllum, Waldst. & Kit. Perennial herb, 3 ft.: lvs. very large, nearly sessile, pinnatisect, the lobes lanceolate and coarsely toothed; heads very many, corymbed; rays white with yellowish tinge, the disk yellow. June, July; an outdoor plant. Hungary. G.W. 12, p. 410.—C. Meri, Hook. f. Herbaceous, with woody root-stock. 1½ ft.; lvs. about 1 in. long, triangular to oblong, pinnatifid: fl.-heads 1½ in. diam., long-stalked; rays 3-toothed, white with redish base. Mx. Morocco; summer in the open. B.M. 5097.—C. multiflorum, Hort. Fls. greenish white: said to be a cross between a simple C. chrysanthemum and C. Palissatum (Pyrethrum Palissatum, Maxim., of N. America, apparently not a garden species).—C. oxfordicum, Muhl. Glabrous herb, undershrub of the Canaries: lvs. obovate-cuneate, coarsely toothed: rays pale yellow.

C. peranthum, Wilh., a form of C. Parthenium.


WILHELM MILLER.
L. H. B.†

Types of the common chrysanthemum.

The common chrysanthemums of the florists (C. hortorum) are often called "large-flowering," and "autumn," to distinguish them from the hardy outdoor kinds, although

935. Chrysanthemum lacustre. A short-rayed form. (X½)

936. Chrysanthemum maximum. (X½)

937. Chrysanthemum Leucanthemum. Ox-eye daisy, or whiteweeK. (X½)
neither of these popular names is entirely accurate or distinctive. They are the blended product of C. indicum and C. morifolium, two species of plants that grow wild in China and Japan. The outdoor or hardy chrysanthemums are derived from the same species, being less developed forms. The florist's chrysanthemum is not necessarily a greenhouse subject; but it is bloomed under glass for protection and to secure a longer season. Ten to fifteen dominant types of chrysanthemums have been recognized by the National Chrysanthemum Society of England. The words "types," "races," and "sections," have always been used by horticulturists to express much the same thing, but types can always be defined clearly, while sections cannot, and the word race should be restricted to cultivated varieties that reproduce their character by seed, which is not the case with the large-flowering chrysanthemums. The following explanation and scheme, it is hoped, will clearly set forth the main types, and explain some of the many terms that confuse the beginner. The horticultural sections are wholly arbitrary, being chiefly for the convenience of competitors at exhibitions, and therefore changing with the fashions. The present classification is based on the form of the flower, as each type can be had in any color found in the whole genus.

A. Single forms: rays in 1 series, or few series: disk low and flat.

1. The Small Single Type.—Fig. 950. Fls. about 2 in. across, star-like, i.e., with the rays arranged in one series around the yellow disk. "Single," however, is a relative term, and in Fig. 950 there is more than one series of rays, but this does not destroy the "single-ness" of effect. All fls. are either single, semi-double, or double, but all the intermediate forms between the two extremes of singleness and doubleness tend to disappear, as they are not desired.

2. The Large Single Type.—Like the preceding, but the fls. 4 in. or more across, and fewer. The large and small single types are practically never grown outdoors and are best suited for pot culture, each specimen bearing 20-80 fls. They are also grown by florists in considerable quantity for cutting.

3. The Small Anemone Type.—Commonly called "Pompon Anemone." Fig. 938. Fls. 2-3 in. across, and usually more numerous than in the large anemone type. All the anemone forms are essentially single, but the raised disk, with its elongated tubular fls., usually yellow but often of other colors, gives them a distinct artistic effect, and they are, therefore, treated as intermediates in character between the single and double forms. Like the single forms, they are less popular than the double kinds, and the varieties are, therefore, less numerous and more subject to the caprices of fashion.

BB. Fls. large, fewer, regular.

4. The Large Anemone Type.—Fls. 4 in or more across and fewer. Heads must have large size, high neatly formed centers, and regularly arranged florets, the disk being composed of long tubes or quills and the rays flat and horizontally arranged.

BBB. Fls. large, few, irregular.

5. The Japanese Anemone Type.—Fig. 939. Fls. 4 in. or more across, and irregular in outline; fantastic and extreme anemone forms.

AAA. Double-fld. forms: rays in many series; disk absent or nearly so.

1. B. Fls. small; rays short.

6. The Pompon Type.—Figs. 940, 949. Fls. 1-2 in. across. The outdoor kinds are likely to be small, flat and buttonlike, while those cult. indoors are usually larger and nearly globular. Fig. 940 shows the former condition. It is from one of the old hardy kinds long cult. in the gardens as "Chinese" or "small-flowered" chrysanthemums, and commonly supposed to be the product of C. indicum, as opposed to the "Japanese" or "large-flowered" kinds intro. in 1862, which marked a new era by being less formal and more fanciful than any of the preceding kinds. Pompons are little cult. under glass in Amer., being regarded mostly as outdoor subjects.

Bb. Fls. large.

c. Blossoms hairy.

7. The Hairy Type.

AA. Anemone-fld. forms: rays as in A; disk high and rounded.

b. Fls. (florets) small, numerous, regular.

BB. Fls. large, fewer, regular.

4. The Large Anemone Type.—Fls. 4 in or more across and fewer. Heads must have large size, high neatly formed centers, and regularly arranged florets, the disk being composed of long tubes or quills and the rays flat and horizontally arranged.

BBB. Fls. large, few, irregular.

5. The Japanese Anemone Type.—Fig. 939. Fls. 4 in. or more across, and irregular in outline; fantastic and extreme anemone forms.

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Bb. Fls. large.

c. Blossoms hairy.

7. The Hairy Type.
considered more curious and interesting than beautiful. So far, nearly all hairy chrysanthemums are of the Japanese Incurved type. Since the hairs are on the backs of the florets, they show best in incurved types.

cc. Blossoms not hairy.

D. Rays reflexed.

8. The Reflexed Type.—Also called “Recurved.” Fig. 942. The reflexed forms can be easily broken up into 3 types. (a) the small and regular, (b) the large and regular, and (c) the large and irregular types. The latest standard requires that reflexed flowers have hemispherical heads, with no trace of thinness in the center, and broad overlapping florets.

DD. Rays incurved.

9. The Incurved Type. Fig. 943 shows the general idea, but such a fl. would hardly win a prize at an English show, where anything short of absolute regularity is relegated to the “Japanese Incurved” section (No. 10). This form is by far the most clear-cut ideal of any of these types, and for many years this ideal of the florists so completely dominated the English chrysanthemum shows that the incurred section came to be known there as the “exhibition” or “show type.” In America the Japanese types, which are less formal and fanciful, early prevailed, but in England this has been the most important section of all.

EE. Form more or less irregular.

10. The Japanese Incurved Type.—This section and the next have been the most important in America. There are many variations of this type. It often happens that the outer 4 or 5 series of rays gradually become reflexed, but if most of the rays are incurred, the variety may be exhibited in this section. Fig. 943.

DDD. Rays of various shapes: forms diverse.

11. The Japanese Types.—The word “Japanese” was originally used to designate the large-fl. fantastic kinds, intro. by Robert Fortune from Japan in 1862. It has never been restricted to varieties imported directly from Japan, but has always included seedlings raised in the western world. Before 1862, all florists’ fls. in England were relatively formal and small. The informal, loose, grotesque, Japanese chrysanthemums, intro. by Fortune broke up the conventional era, and the demand for large specimen blooms that resulted in fl.s. shows all over the world reached Amer. in 1889. The “Japanese section” now means little more than “Miscellaneous.” The 10 types previously mentioned can be rather accurately defined, but the Japa-

943. Type of Japanese incurred chrysanthemum.

Relative importance and uses of the foregoing types.—

In general, the large-flowered forms are more popular than the small-flowered forms, especially at exhibitions, where great size is often the greatest factor in prize-winning. Types 9, 10 and 11 are the most important in America, especially the Japanese section. The flowers of types 9 and 10 are likely to be more compact and globular, and hence better for long shipments than the looser and more fanciful types. Types 9, 10 and 11 are those to which most care is given, especially in disbudding and training. They are the ones most commonly grown by the florists for cut-flowers, and whenever one large flower on a long stem is desired. The anemone-flowered forms are all usually considered as curiosities, especially the Japanese anemones, which are often exhibited as freaks and oddities. The single and anemone-flowered forms are used chiefly for specimens in pots with many small flowers, but all the other types are used for the same purpose. For outdoor culture, the hardy pompons, with their numerous small flowers, are usually better than the large-flowering or Japanese kinds.

As an indication of the constant change in standards of appreciation, may be cited the present popularity

of short-stemmed chrysanthemums (Fig. 944) as distinguished from the greatly elongated stem that was exclusively desired some years ago; and also the demand for bushy many-flowered plants, producing small bloom as compared with the former excessively large detached flowers.

The current English classification.

The Floral Committee of the National Chrysanthemum Society (of England) in 1912 published the following “new classification of Chrysanthemums” (published also in American Florist, Sept. 21, 1912, by Elmer D. Smith):

SECTION I. INCURVED (Fig. 945).

The distinguishing characteristics of this section are the globular form and regular outline of the blooms. The flower should be as nearly a globe as possible, as depth is an important point in estimating its value. The florets ought to be smooth, rounded, or somewhat pointed at the tip, of sufficient length to form a graceful curve, and be regularly arranged. A hollow center or prominent eye are serious defects, as also are a roughness in the blooms, unevenness of outline and a want of freshness in the outer florets.

The section is now subdivided into:

Sub-section (a).—Large-flowered varieties.

Sub-section (b).—Medium- and small-flowered varieties.
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SECTION II. JAPANESE

Japanese varieties include a wide range of form, size and color. Their florets may be large, flat, fluted, quilled or tubulated, of varying length, from short, straight, spreading florets to long, drooping, twisted or irregularly incurved. In breadth the florets may vary greatly, ranging from those an inch in width to others scarcely broader than a stout thread. Some also either have the tips of the florets cupped, hollowed, curved or reflexed.

Sub-section I. Japanese.
(a) Large-flowered varieties.
(b) Medium-flowered varieties.
(c) Small-flowered varieties.

Sub-section II. Incurved Japanese.
(a) Large-flowered varieties.
(b) Medium- and small-flowered.

Sub-section III. Hairy Japanese.

Refixed section to be deleted as these varieties are now referred to other sections.

SECTION III. ANEMONES (Figs. 947 and 948; also Figs. 938, 939).

The distinctive characteristics of anemone varieties are their high, neatly formed centers and regularly arranged ray-florets. There are two distinct sets of florets, one quilled and forming the center or disk, and the other flat and more or less horizontally arranged, forming the border or ray. The flowers may have the ray or guard florets broad or twisted, or narrow, and forming a fringe, but should be so regularly arranged as to form a circle round the center, the latter should be a hemispheroidal disk, with no trace of hollowness and every floret in its place.

(a) Large-flowered, i.e., with a diameter of 3 inches and upwards.
(b) Small-flowered, i.e., with a diameter of less than 3 inches.

SECTION IV. POMPONS (Fig. 949; also Fig. 940).

Pompon varieties have blooms that may be somewhat flat or nearly globular, very neat and compact, formed of short, flat, fluted or quilled florets, regularly spreading or erect, the florets of each bloom being of one character.

(a) Large-flowered, i.e., with a diameter of 2 inches and upwards.
(b) Small-flowered, i.e., with a diameter of less than 2 inches.

SECTION V. SINGLES (Fig. 950).

Single varieties may be of any size and form; but the florets, whether short and rigid or long and drooping, should be arranged sufficiently close together to form a regular fringe.

Sub-section I. Varieties with one or two rows of ray florets.

(a) Large-flowered, i.e., with a diameter of 3 inches and upwards.
(b) Medium- and small-flowered, i.e., with a diameter of less than 3 inches.

Sub-section II. Varieties with three to five rows of ray florets.

(a) Large-flowered, i.e., with a diameter of 3 inches and upwards.
(b) Medium- and small-flowered, i.e., with a diameter of less than 3 inches.

Sub-section III. Anemone-centered varieties.

SECTION VI. SPIDER, PLUMED AND FEATHERY.

Varieties in this section have small or medium-sized flowers of eccentric shape, but most frequently of a light and graceful character; some have threadlike florets, and some have broader florets, but they may be either erect, horizontal or drooping and of various shapes and colors.

Market, Decorative and Early-flowering varieties will be dealt with, but lists are given only under each heading for general guidance.

WILHELM MILLER.

Culture of the florist's chrysanthemum (C. hortorum)

The first step towards success in chrysanthemum-culture is good healthy cuttings, and as they become established plants they should receive generous culture throughout their entire growing season. This requires close attention to watering, airin, repotting, and a liberal supply of nutriment.

Chrysanthemums are propagated in four ways,—by cuttings, division, seeds, and grafting. By far the most important is the first, because it is the most rapid. It is the method of the florists. In localities in which the plants can remain outdoors over winter without injury, they may be increased by division. This system is practised more by amateurs than florists, being the easiest method for the home garden but not rapid enough for the florist. Propagation by seeds is employed only to produce new varieties, and is discussed at length elsewhere (page 764). Grafting is seldom practised. Skilful gardeners sometimes graft a dozen or more varieties on a large plant, and the sight of many different colored fls. on the same plant is always interesting at exhibitions.

Section I. Culture of chrysanthemums for cut-flowers.

This account is intended to describe the method chiefly employed by florists, the plants being grown in benches under glass.

1. Propagation by cuttings.—Plants of the preceding year afford stock from which to propagate the following season. They produce quantities of stools or suckers, which form excellent material for the cuttings. These are usually taken from 1½ to 3 inches in length, the lower leaves removed, also the tips of the broad leaves, then placed in propagating-beds close together, where they are kept continually wet until rooted. To insure a large percentage, the condition of the cuttings should be moderately soft. If the stock plants are allowed to become excessively dry, the cuttings are likely to harden, and thus be very slow in producing roots. Single-eye cuttings may be used of new and scarce varieties when necessary. These are fastened to a tooth-pick with finestemming wire, allowing half of the toothpick to extend below the end of the

945. Incurved type.


948. Pompon anemone type.
cutting, and when inserted in the cutting-bed the end of the cutting should rest upon the sand. It requires more time to produce good plants by this system than when fair-sized cuttings can be taken, but it is often of service when stock is limited. The propagating-house should be well-aired, and it is advisable to change the sand after the second or third batch of cuttings has been removed, to avoid what is termed cutting-bench fungus. The cuttings should never be allowed to wilt, and this is avoided by giving abundance of air, and when the temperature reaches over 70° from sun heat, by shading with some material, either cloth or paper. Fig. 851 shows a good form of chrysanthemum cutting.

2. Planting.—Cuttings should not be allowed to remain in the cutting-bench after the roots are ½ inch in length, or they will become hardened, which will check the growth. As soon as rooted, they should be potted into 2- or 2½-inch pots, using good mellow soil, with a slight admixture of decomposed manure. Most of the large flowers are produced under glass, and the bench system is generally employed, which consists of 4 or 5 inches of soil placed upon benches. In these benches the small plants are planted 8 to 12 inches apart each way, from the latter part of May to the middle of July. Those planted at the first date usually give the best results. The soil should be pounded rather firm either before planting or after the plants have become established.

3. Soil.—There are many ideas as to what soil is best suited for the chrysanthemum, but good blooms may be grown on clay or light sandy loam, provided the cultivator is a close observer and considers the condition of the soil in which they are growing. Clay soil, being more retentive of moisture, will require less water and feeding than soil of a more porous nature. The chrysanthemum is a gross feeder, and, therefore, the fertility of the soil is very important in the production of fine blooms. Each expert has a way of his own in preparing the soil, but as equally good results have been secured under varied conditions, it is safe to conclude that the method of preparing the soil has little to do with the results, provided there is sufficient food within their reach. All concede that fresh-cut sod, piled late the preceding fall or in early spring, with one-fourth to one-fifth its bulk of half-decomposed manure, forms an excellent compost. Many use 1 or 2 inches of manure as a mulch after the plants have become established. Others place an inch of half-decomposed manure in the bottom of the bench. This the roots find as soon as they require it. Good blooms have been grown by planting on decomposed sod and relying on liquid applications of chemicals.

4. Feeding.—No definite rule can be given for this work, as so much depends on the amount of food incorporated in the soil. If the soil be very rich, the liquid applications should be only occasional and very dilute. There is more danger of overfeeding by the use of liquids than by using excessively rich soil. Each grower must depend on his own judgment as to the requirements, being guided by the appearance of the plants. When the leaves become dark-colored and very brittle, it is safe to consider that the limit in feeding has been reached. Some varieties refuse to bud when overfed, making a mass of leaves instead. Others show very contorted petals, giving a rough unfinished bloom. Still others, particularly the red varieties, are likely to be ruined by decomposition of the petals, called "burning," especially if the atmosphere is allowed to become hot and stuffy. The same result will follow in dark weather, or when the nights become cool, if the moisture of the house is allowed to fall upon the blooms. Under such conditions, the ventilation should remain on during the night, or heat be turned in according to the outside temperature.

5. Watering and shading.—Let the foliage be the index to watering. If it appears yellow and sickly, use less water, and see that the drainage is perfect. There is little danger of over-watering as long as the foliage is bright green. A little shading at planting time is not objectionable, but it should be removed as soon as the plants are established. It is often necessary to shade the pink and red flowers, if the weather continues bright for some time, to prevent their fading.

6. Training.—When the plants are 8 inches high, they should be tied either to stakes or to jute twine. In the former system, use one horizontal wire over each row, tying the stake to this after the bottom has been inserted into the ground. Two wires will be necessary when twine is used, one above the plants and the other a few inches above the soil to which the twine is fastened. From the first of August until the flowers are in color, all lateral growths should be removed as soon as they appear, allowing only the shoots intended for flowers to remain. The above remarks refer to the training of bench chrysanthemums as grown by florists for cut-flowers. Other kinds of training are described under Section II, pages 763-4.

7. Disbudding.—No special date can be given for this work, as much depends on the season and the earliness or lateness of the variety to be treated. Buds usually begin to form on the early sorts about August 15, or soon after, and some of the late varieties are not in condition before October 10. Golden Glow and Smith Advance among the large-flowering, and several of the early-flowering of the hardy varieties, are exceptions to the foregoing, as they will set buds in June and July that will develop very good blooms during the month of August and later. The advent of these kinds has advanced the flowering season four to six weeks. The object of removing the weak and small buds and retaining the best is to con-
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centrate the whole energy of the plant and thereby increase the size of the flower.

There are two forms of buds, crowns and terminals. A crown bud (Fig. 952) is formed first, never with other flower-buds, and is provided with lateral growths which, if allowed to remain, will continue their growth and produce terminal buds later. Terminal buds come later, always in clusters (Fig. 954), are never associated with lateral growths, and terminate the plant's growth for that season. If the crown bud is to be saved, remove the lateral growths as shown by Figs. 952, 953, and the operation is complete. If the terminal bud is desired, remove the crown and allow one, two or three (according to the vigor of the plant) of the growths to remain. In a few weeks these will show a cluster of buds, and, when well advanced, it will be noticed that the largest is at the apex of the growth (the one saved, if perfect, as it usually is), and one at each of the leaf axils (see Fig. 955). The rejected buds are easiest and safest removed with the thumb and forefinger. Fig. 956. Should the bud appear to be one-sided or otherwise imperfect, remove it and repeat the process. In removing the buds, begin at the top and work down. By so doing there are buds in reserve, in case the best one should accidentally be broken, while if the reverse course were taken, and the best bud broken at the completion of the work, all the labor would be lost. A few hours' disbudding will teach one how far the buds should be advanced to disbud easily. Early and late in the day, when the growths are brittle, are the best times for the work. Some growers speak of first, second, and third buds. The first is a crown, and usually appears on early-propagated plants from July 15 to August 15. If removed, the lateral growths push forward, forming another bud. In many cases in which the crowns are removed early, the next bud is not a terminal, but a second crown, which is termed the second bud. Remove this, and the third bud will be the terminal. Plants propagated in May and June usually give the second and third bud, not forming the typical crown. Those struck in July and planted late give the terminal only. Most of the best blooms are from second crown and terminal. Pink, bronze and red flowers from first crowns are much lighter in color than those from later buds. They are large, but very often abnormal to such an extent as to be decidedly inferior. This is doubtless due to the fact that the food utilized in their construction, owing to the long time consumed in development. The hot weather of September and October must have a detrimental effect upon the color.

Enemies. — Green aphis (Aphis rufomaculata) and the black aphis (Macrosiphum sanboni) are sometimes very troublesome. They may be controlled by spraying with "Black Leaf 40" tobacco extract, one part to 800 parts water with soap added. Fumigation with hydrocyanic acid gas is also widely practised by commercial growers. In moderately tight greenhouses, use one ounce potassium cyanide for each 3,500 cubic feet of space for all-night fumigation. Fire-ant (Solenopsis rubra) and Red Spider (Tetranychus binaculatus) becomes injurious if neglected. It may be easily controlled by spraying with water, using much force and little water to avoid drenching the beds. The use of sulfur has also a beneficial effect.

Thrips. (See Carnation).

Leaf-meal (Phyllostria ferralis) is very frequently very abundant in some parts of the country. It is essentially a greenhouse pest although it can live out-of-doors. The greenish whitish striped caterpillars, 3/4 inch in length when full grown, feed on the under side of the leaves which they roll or tie together. The moth is pale brownish with an expanse of about 3/4 inch. The leaves are blistered and withered up and when the temperature is highest, it can be controlled by spraying with arsenate of lead. It is advisable to begin the work early in the season when the insects are less numerous and the plants are small. Care should be taken to hit the under surface of the leaves.

The tarnished or plant-bug (Lygus pratensis) often injures the blossom buds by its feeding punctures. This causes wilting and blind growths. The bugs may be excluded from greenhouses with screens. Out-of-doors no satisfactory means of control has been devised. But it has been noticed that plants growing in partial shade are less subject to injury.

Grasshoppers are sometimes injurious. They may be destroyed by the use of arsenate of lead or by hand-picking.

Diseases. — Damping-off in the cutting-benches is not uncommon. See Damping-off, page 955. Rust (Puccinia chrysanthemum) is the only serious fungous disease of the chrysanthemum. It is characterized by the reddish brown pulverulent masses on the foliage consisting of the spores of the fungus. The disease is usually not destructive but may make the foliage unsightly. Any leaves appearing diseased should be removed promptly. In watering care should be taken not to wet the foliage, as moisture on the leaves allows new infections. Leaf-blight (Cylindrosporum) and leaf-spot (Septoria) occur on mature or languishing foliage and usually do little damage.

Section II.—Culture of chrysanthemums in pots.

The same principles are employed in pot culture as when planted upon the bench, with the exception that the plants are generally allowed to produce more blooms. The most popular type of pot-plant for home growing, or for sale by florists and intended for home use, is a compact, bushy plant, 1 to 2 feet high, branched at the base, and bearing four to twenty flowers averaging 3 to 4 inches across. They are here called "market plants," "single-stem plants" are also popular. Great quantities of large flowers (say twenty to one hundred) are required. Such plants are grown on a potted plant, except for exhibitions. Such plants are commonly called specimens, and the three leading forms are the bush, the standard and the pyramid, the first mentioned being the most popular.

1. Market plants.—Dwarf plants of symmetrical form, with foliage down to the pots, are the most salable, and when thus grown require constant attention as to watering and stopping, allowing each plant plenty of room to keep the lower leaves in a healthy condition. Cuttings taken June 1 and grown in pots, or
planted on old carnation benches or in spent hotbeds (light soil preferable), and lifted by August 15, will make very good plants 1 to 1½ feet high. The reason for lifting early is to have them well established in their flowering pots before the buds are formed.

2. Single-stem plants.—Same culture as market plants, except that they are restricted to one stem and flower. Those from 1 to 2 feet in height are more effective and useful than tall ones. For this reason, many prefer plunging the pots out-of-doors where they have the full benefit of the sun and air, making them more dwarf than when grown under glass.

3. Pot-plants for cut-flowers. — Culture same as for specimen plants, except that the nipping should be discontinued July 1 to give sufficient length to the stems. If large flowers are desired, restrict the plants to eight or ten growths. Such plants can be accommodated in less space than specimens, when the chief object is symmetry.

4. Bush plants.—For large bush plants, the cuttings should be struck early in February, and grown along in a cool airy house, giving attention to potting as often as necessary. The final potting into 10- or 12-inch pots generally takes place in June. They are potted moderately firm, and watered sparingly until well rooted. As soon as the plants are 5 or 6 inches high the tips should be pinched out, to induce several growths to start. As the season advances and the plants make rapid growth, pinching must be attended to every day up to the latter part of July, to give as many breaks as possible and keep them in symmetrical form. By the middle of August (if not previously attended to), staking and getting the plants in shape will be a very important detail. If stakes are used, they must be continually tied-out, as the stems soon begin to harden, and this work can be best accomplished by looking them over daily. Light stakes of any material may be used. Many other methods are in use, such as wire hoops and wire framework, to which the growths are securely tied.

5. Standards differ from bush plants in having one stout self-supporting stem, instead of many stems. They require the same culture as bush plants, with the exception that they are not stopped, but allowed to make one continuous growth until 3, 4 or 5 feet high, and are then treated the same as bush plants. They require the same attention as to stopping and tying to secure symmetrical heads.

6. Pyramids are only another form of bush plants, and it is optional with the grower which form he prefers.

Section III. — Culture of chrysanthemums for the production of new varieties.

The object of seed-saving is the improvement of existing varieties. It is not conclusive, however, that all seedlings will be improvements; in fact, it is far from this, as the greater proportion are inferior to their antecedents. Only those who give the most careful consideration to cross-fertilization are certain of marked success. Hand-hybridized seeds possess value over those haphazardly pollinated by wind and insects only according to the degree of intelligence employed in the selection of parents. What the result will be when a white flower is fertilized with a yellow one, the operator cannot determine at the outset. It may be either white, yellow, intermediate, or partake of some antecedent, and thus be distinct from either. Improvements in color can be secured only by the union of colors, bearing in mind the laws of nature in uniting two to make the third. Red upon yellow, or vice-versa, may intensify the red or yellow—give orange or bronze, as nature may see fit. The operator is more certain of improving along other lines, such as sturdiness or dwarfishness of growth, earliness or lateness of bloom, or doubleness of flowers. The selection of those most perfect in these particulars is very sure to give similar or improved results. Always keep a record of this work showing the parents of a seedling. The satisfaction of knowing how a meritorious variety was produced more than pays for the trouble, and may lead to further improvements along certain lines. — The operation begins when the flower is half open, cutting the petals off close to their base with a pair of scissors, until the style is exposed. Should the flower show signs of having disk or staminate florets, remove these with the points of the scissors and thus avoid self-fertilization. When the styles are fully grown and developed, the upper surface or stigma is in condition to receive the pollen. By pushing aside (with the thumb) the ray-florets of the flower desired for pollen, the disk-florets which produce the pollen will become visible. The pollen may be collected on a camel’s-hair pencil or toothpick and applied to the stigma of the flower previously prepared. If a toothpick be used, never use it for more than one kind of pollen. By allowing the camel’s-hair pencil to stand in an open-mouthed vial of alcohol a few moments after using, it may be again used, when dry, upon another variety without fear of the pollen of the former operation affecting the present.—Cuttings struck in June and July and grown in single blooms in 4-inch pots are the most convenient for seedling. Such flowers, if not given too much food are more natural and furnish an abundance of pollen, as well as being easier to trim than the massive blooms produced for the exhibition table. The pollinating should be done on bright, sunny days, and as early in the day as possible. As soon as the seed plants are trimmed, they should be placed by themselves to avoid fertilization by insects, and should there remain until the seeds are ripe. Keep the plants rather on the dry side, and give abundance of air. Seeds, which ripen in five to six weeks, should be saved without delay, and carefully labelled. In sowing seeds,
as in England and France. There are a few varieties that have stood the test for several years; such as Ivory, 1889; Geo. W. Childs, 1892; Golden Wedding, 1893; Major Bonnaffon, 1894; Yanona, 1896; W. H. Chadwick, 1896; Frau von Nagoya, 1899; Mrs. W. H. Chadwick, Col. D. Appleton and White Bonnaffon, 1900. There are many other varieties that have stood the test for four or five years.

It is not the purpose of this article to recommend varieties of chrysanthemums, but the following list includes the best varieties known in North America at the present time. The list will be valuable as showing a serviceable classification, and also for reference when other varieties have come to existence:


Section V.—Culture of chrysanthemums for exhibition.

This branch in which the highest standard must be attained if the slightest hope of success at the exhibition is entertained, requires a thorough knowledge of the plants, the seasons for the handling, and the ability to bring them to the highest state of perfection. The methods are not very different from those employed in the production of high-grade commercial blooms. The most successful growers usually propagate earlier, and if grown on benches they are also planted earlier to secure the rigors of frost. The finest blooms are those produced on the private exhibition, as the grower has charge of a few hundred plants, giving them his undivided attention, so that every need is provided at the proper time. During the past few years, the majority of such expert growers have adopted a system of growing in pots, each plant restricted to one bloom, which is practically the same method as the one used throughout England for many years. Here they are kept under glass the entire season, while in England the climate permits them to be grown out-of-doors during the summer months. By this method, the roots are more closely confined, which has a tendency to produce short-jointed plants with stronger stems, and each perfect contour of the bloom of each variety may be treated according to its needs, especially when liquid fertilizers are necessary to promote the maximum in size and finish. The other factors that lead to the successful exhibitor are full consideration of the requirements of the schedule, so as to select the best varieties for the various classes, and a complete knowledge of packing and staging the blooms. During the past decade, those originating new varieties have scrutinized more closely in making a decision, and, as the commercial and exhibition varieties are different from an entirely different standpoint, these two sections are drifting farther and farther apart. Size is the foremost quality from the exhibition point of view.

At the present time (1912), the varieties generally shown in prize-winning exhibitions are as follows: White: May, Good Hall, Michael, Mersa, Mrs. David Syme, Naoman, Wm. Turner; Yellow: F. S. Vallis, Lenox, Mrs. Geo. Hunt, Mrs. J. C. Neil, Yellow Miller. Pink: Maud Weaver, Maud Dean; Three-color: Totty, O. H. Broonhead, Wm. Duckham, Wells' Late Pink, Bronze: Wm. Turner, Mrs. J. T. Kahn, Mrs. H. Stephens, Mrs. W. H. Chadwick, Col. D. Appleton, Golden Eagle, Golden Wedding, Yellow Eaton, Golden Chadwick, Major Bonnaffon, Mrs. W. H. Chadwick, Mayor Weaver, Maud Dean. Red:—W. H. Chadwick, Mrs. W. H. Chadwick, C. W. Woodman.

A few of the commercial section are suitable for this purpose, especially when the schedule calls for twelve or more blooms of a kind for one vase and at exhibitions at which artificial supports are prohibited. The best are as follows: White: May, Good Hall, Timothy Eaton, Chadwick Improved, Mrs. Jerome Jones, Yellow: Col. D. Appleton, Golden Eagle, Golden Wedding, Yellow Eaton, Golden Chadwick, Major Bonnaffon, Mrs. W. H. Chadwick, Mayor Weaver, Maud Dean. Red:—Dick Witterstaetter, Geo. W. Childs.

Section VI.—Culture of chrysanthemums out-of-doors.

The kinds most suitable for out-of-door culture are those making abundant of rhizomes or underground stems, which withstand the winter and furnish the new growths for the successive years. The Pompoms are more hardy than the large-flowering sorts, and, as many blooms in both classes are interested in this subject, especially north of the Ohio River, it should be fully considered in selecting for this purpose. It is more practicable to choose varieties which perfect their flowers early, during August, September and October when grown in the northern states, as the buds are less likely to be injured while in a soft growing state by frost. In the South many of the later varieties will live over and be satisfactory, owing to the continuance of mild weather. In the past few years, some improvements in this section have been attained, many of which are the results of crosses between the Pompons and the large-flowering Japanese, in which the progeny have combined the hardiness and dwarf habit of the former with the larger and more irregular-formed flowers of the latter, producing aster-like flowers rather than the symmetrical form of the Pompons. All of the types may be successfully grown out-of-doors if provision is made to protect the bud, blooms and roots from severe frost. A temporary covering of straw early autumn will protect the blooms, but the roots will require artificial heat or should be removed to the greenhouse or frame where the temperature can be maintained a few degrees above freezing. In growing exhibition blooms out-of-doors, all the important details, such as watering, airing, disbudding, feeding,
staking and tying, must be complied with, if the grower expects to be rewarded for his efforts.

The oldest of the outdoor types are the Pompons, which produce from forty to one hundred buttons an inch or two across, with short and regular rays. Such plants can be left outdoors all winter.

Since the large-flowering or Japanese types have come in, numberless attempts have been made to grow them outdoors, but with poor results. The greenhouse varieties are not so hardy. In the North they are likely to be killed by the winter. Their flowers usually lack in size, depth and symmetry, largely because there are more of them on a plant than a florist allows for his best blooms, but chiefly because they do not have so much care in general as is given to plants under glass, where space is precious. For the very best results chrysanthemums must be flowered under glass, and they need the greatest care and forethought practi-

like, should be kept by themselves, because their colors are variable and because they make a violet and yellow contrast with yellow, which few persons can find agreeable.

CHRYSOGONUM

Wilhelm Miller.

Elmer Smith.

CHRYSOBÁCTRON (golden wand, from the Greek). Lislíaceæ. Two New Zealand rhizomatous herbs, usually classed with "bulbs" by gardeners, bearing many small yellow fls. in a long raceme on the top of an elongated scape; plant often dichotomous or polygamous; perianth 6-parted, the segms. nearly equal; stamens 6: caps. The genus is now commonly united with the S. African Bulbinella, the combined species becoming 13 or 14. C. Hökéri, Colenso (Bulbinella Hökéri, Benth & Hook., now the accepted name. Anthéricum Hökéri, Colenso) is in cult. in this country. It is a hardy plant 2-3 ft. high, with sword-like foliage; fls. 1½ in. diam., bright yellow, perfect, on slender pedicels, the segms. linear-oblong, and obtuse and spreading. B.M. 4602.—Cult. in the ordinary border, and treated like the asphodel, they do well. But they are improved in rich, deep and rather moist soil; strong clumps, 4 or 6 yrs. old, are at their best and are very excellent plants. After that they should be divided. Prop. by division or seed. Blooms in June and July.

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CHRYSOBÁLANUS (golden acorn, from the Greek, referring to the fruit). Rosaceseæ. Bushes or trees, planted far south for ornament; fruit often edible.

Leaves thick and coriaceous, entire, glabrous: fls. white, rather small, in axillary or terminal short cymes; calyx 5-parted; petals 5, clawed; stamens 15 to many, some of them perhaps sterile: fr. a dryish-pulpy drupe, with stone pointed at base and ridged.—Two species in tropics of Amer. and Afr., reaching Fla., and another one in S. U. S.

Icaco, Linn. Cocoa-Plum. Icaico. On coasts and along streams in S. Fla., to S. Amer., and also in Afr., and is sometimes planted in the extreme S. (and in the tropics) as an ornamental shrub and for its sweetish but insipid and dry plum-shaped frs. which are sometimes used for preserves. It is a mere bush on the northern limits of its distribution, and in its relations, but in extreme S. Fla., it reaches a height of 25–30 ft. Lvs. glossy, thick, obovate (sometimes obcordate): fls. small and white, in axillary erect racemes or cymes; calyx 5-cleft, pubescent; petals 5; stamens about 20: fr. 1-seeded, 1–1½ in. long, varying from nearly white to almost black, globular or nearly so. Wood close-grained and heavy, hard, brown or reddish. It is best prop. by seeds, but may also be had from cuttings of half-ripened wood. C. pellucidus, Meyer, the small-fruited cocoa-plum, is a smaller plant, with smaller lvs., petals spatulate, drupe obovoid or oblong, about half the size of that of C. icaco; it grows in cxt. S. Fla. and farther south; sparsely or not at all planted. C. oblongifolius, Michx., occurs from Ga. to Fla. and Miss. It is a low shrub, spreading widely by means of underground stts.: fr.-blades longer than broad, sharp-tipped: fr. ovoid or obvoid, about 1–1½ in. long: not in cult.

CHRYSÓCOMA: Línagría.

CHRYSÓDIUM: Klaphoglossum.

CHRYSÓGONUM (Greek-made name, golden knoe or joint), Composita. A few composites, of which C. virginianum, Linn., is a perennial yellow-fld. plant of S. Pa. and south; sometimes cult. as a border plant. It blooms in spring or early summer on stts. which become 1 ft. high, the heads being solitary and pedun-