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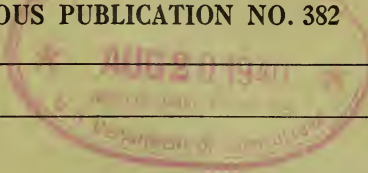


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WASHINGTON, D. C.

JULY 1940



A REVISION OF THE
GENUS LYCOPERSICON

By

CORNELIUS H. MULLER

Assistant Botanist
Division of Plant Exploration and Introduction
Bureau of Plant Industry



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INTRODUCTION

The genus *Lycopersicon* has for several decades been of considerable economic importance because of one of its species, *L. esculentum* Mill., the common tomato. More recently the other species of the genus have become the objects of great interest in programs of tomato breeding for the purpose of developing disease-resistant strains of commercially desirable tomatoes. This increased attention to the wild relatives of the common tomato soon revealed the greatly confused state of the taxonomy of the group. Apparently this confusion exists both in the nomenclature and in the phylogenetic concepts and has come about through the remarkable variability of almost all strains of the several species. Further difficulties no doubt arose from the scarcity of available herbarium material. Coupled with the tendency of hardly any two specimens of the same species to look alike, this scarcity of material encouraged the description of a number of so-called species, which cannot be held distinct.

In late 1937 the Division of Plant Exploration and Introduction commissioned H. L. Blood, assisted by Louis Tremelling, to make a trip along the western coast of South America and inland for the purpose of collecting wild species of *Lycopersicon* that might be tried in breeding experiments then being planned by other divisions of the Bureau. The expedition was in the field from early December

¹ The author wishes to express his indebtedness to the curators of the herbaria from which material was borrowed for study. He is particularly grateful to B. Y. Morrison, principal horticulturist, in charge of the Division of Plant Exploration and Introduction, for having contributed the drawings for the several plates and otherwise having aided this study. C. V. Morton, of the Smithsonian Institution, and S. F. Blake, C. O. Erlanson, and P. G. Russell, of the Division of Plant Exploration and Introduction, carefully read the manuscript and generously offered valuable criticism and suggestions.

1937 until May 1938, and 460 numbers of herbarium specimens and viable seed samples of the various species were collected. The collections represented a considerable latitude of variation within each of the known species save *Lycopersicon cheesmanii* Riley of the Galápagos Islands, which does not occur on the mainland.

With the exception of some of the numbers of *Lycopersicon esculentum* and *L. esculentum* var. *cerasiforme* (Dun.) Gray, the majority of these collections were grown at the United States Plant Introduction Garden at Glenn Dale, Md., during the summer of 1938 where they were studied in the field and additional herbarium specimens made. The study of so large a volume of material automatically eliminated the most serious obstacles to attaining an understanding of the relationships of the species. Subsequently a study was made of the herbarium specimens in the United States National Herbarium (US²), the herbaria of the National Arboretum (USNA), the New York Botanical Garden (NY), the Philadelphia Academy of Natural Sciences (ANS), the Field Museum of Natural History (F), the Bailey Hortorium (BH), and the Gray Herbarium of Harvard University (G). The total number of sheets annotated is approximately 625 (not counting the numerous duplicates and cultivated specimens from the Blood and Tremelling collection).

HISTORY

Lycopersicon is a relatively small genus in the family Solanaceae. It was regarded by Linnaeus as a part of the genus *Solanum* to which it is undoubtedly very closely related. That the group of species comprising the tomatoes is sufficiently distinct to warrant generic recognition has been generally agreed upon among modern botanists.

The generic name *Lycopersicon* was first validly published by Miller³ in 1754. In the same year, as well as the preceding, Linnaeus⁴ treated the tomato species as *Solanum* species, a concept in which he was followed subsequently by Miller⁵ and others. In 1787 Medicus⁶ proposed the name *Amatula* to include certain species of *Lycopersicon*. When the genus was finally recognized generally as being distinct from *Solanum*, Miller's name was used to designate it, but Hill's erroneous spelling,⁷ *Lycopersicum*, was adopted, and it was not until Druce⁸ in 1914 pointed out the error that Miller's original name was generally taken up again.

In the year 1768 Miller⁹ included 7 species under *Lycopersicon*. Three of these are now considered to be true *Solanum* species, and 1 is an indistinguishable form of the common *L. esculentum*. In addition, *L. pimpinellifolium* Mill. and *L. peruvianum* Mill. were described. In 1813 Dunal¹⁰ credited 6 species to the genus. Of these, 3 have been reduced to synonymy or subspecific rank, and no truly new species were added to Miller's list. In 1852 Dunal¹¹ produced the last

² The capital letters in parentheses are used in the citations of specimens to indicate the several herbaria from which material has been available for study and from which specimens are cited in this publication.

³ Miller, Gard. Dict. Abr. ed. 4. 3. 1754.

⁴ Linnaeus, Sp. Pl. 185. 1753. et Gen. Pl. ed. 5. 224. 1754.

⁵ Miller, Gard. and Bot. Dict. Posth. ed. 1807.

⁶ Medicus, Ueber Geschl. Malventam. 106. 1787.

⁷ Hill, Veg. Syst. 9:32. 1765.

⁸ Druce, Rpt. Bot. Exch. Cl. Brit. Isles 1913: 433. 1914.

⁹ Miller, Gard. Dict. ed. 8. 1768.

¹⁰ Dunal, Hist. Sol. 109. 1813.

¹¹ Dunal in DC. Prodr. 13 1: 23. 1852.

complete review of the genus, using Hill's form of the generic name, *Lycopersicum*. He credited the genus with a total of 10 species of which 3 are the synonyms and subspecific forms included in his treatment of 1813, 3 are additional synonyms and subspecific forms, and 1 is *L. hirsutum* H. and B. Thus the total number of species in Dunal's final treatment that are now recognized is 4. His *L. chilense* (here regarded as synonymous with *L. peruvianum* var. *dentatum* Dun.) is exceedingly variable and caused Philippi,¹² in the course of his Chilean studies, to propose 4 species here regarded as indistinguishable. In 1925 Riley¹³ proposed *L. cheesmanii*, a species endemic to the Galápagos Islands, which had previously been identified with *L. peruvianum* by various authors. Such species as have been proposed from Old World localities have all proved to be derivatives of the exceedingly variable cultigen, *L. esculentum*, and no species can be regarded as indigenous outside South America and possibly subtropical North America. In the present study 1 new species is proposed, a relative of the fairly stable *L. hirsutum*.

GROSS ANATOMY

The principal object in offering a discussion of the anatomy of the group is to explain, and serve as a guide to the use of, the key and descriptions in the taxonomic treatment. For that reason it seems unnecessary to include a complete anatomical treatment.

ROOTS.—The capability of most strains of the various species for persisting as biennials or even perennials is correlated with the variability in the degree of lignification of roots. The root systems of the annual forms are typically characterized by a fairly well-developed taproot accompanied by an abundance of fibrous secondary roots, thus giving the entire system an aspect midway between a taproot system and a fibrous root system. Biennial and perennial forms (very poorly marked in the material examined) soon develop ligneous crowns. Many of these crowns are several diameters thicker than the several stems that issue from them. This crown formation in perennial forms occurs early in the first growing season so that it is evident even in plants grown in temperate latitudes where they will be killed by the first heavy frost in autumn.

STEMS.—The various species differ widely in the nature of their stems. All are herbaceous, but the lignified root crown in some species is extended into an equally lignified and thickened stem several centimeters to a decimeter or two in length from which the several sprawling, prostrate, or vining branches arise. These branches are for the most part very little lignified. In the common cultigen and in *L. hirsutum* the branches are very thick and coarse, and in the latter they stand almost erect until maturity when they can no longer quite support their own weight. Most of the stems are no doubt biennial or perennial in climates having neither killing frosts nor excessively long desiccating periods, but such survival as occurs is the result of the mild climates in which they grow rather than of any modification of the herbaceous stems and naked buds. Those forms that do not develop a lignified root crown, and are probably

¹² Philippi, Reise durch Wueste Atacama. 42. 1860; An. Mus. Nac. Chil. 63. 1892; in Reiche, Fl. Chil. 358-359. 1910.

¹³ Riley, Bul. Misc. Inform. Kew 1925: 227. 1925.

annual or indeterminately biennial in persistence, do not have basally lignified stems. This character is not constant for any group.

The branching is alternate and very irregular. Some of the vining forms produce several simple or scarcely branched stems from the base as does the erect *L. hirsutum*. Some forms of the cultigen are semierect, short-stemmed, and densely branched. Still others, such as forms of *L. pimpinellifolium*, combine the densely branched character with elongate, slender stems to form a tangle of herbage.

Little information is available on the sizes of the plants, a character that is highly variable at any rate. The semierect *L. hirsutum* reaches a height of nearly 2 m. under favorable conditions. Both *L. peruvianum* and *L. pimpinellifolium* sometimes produce vining stems 3 m. in length. Stunted plants of all species may grow to a length of only 3 or 4 dm.

LEAVES.—The leaves of all the species in the genus are alternate and odd-pinnately compound. In most species they are interrupted-pinnate by the reduction in size of alternate pairs of leaflets. At the base of the leaf rachis or petiole there may be a pair of foliaceous, stipulelike bracts or pseudostipules essentially the same as the bracts subtending the bases of the peduncles in some species. These pseudostipules may be similar in size and shape to the leaflets, or they may be much reduced in size or totally lacking. They are, with some exceptions, characteristic of the subgenus *Eriopersicon*, but the petioles of the species of *Eulycopersicon* are entirely naked. The typical leaf consists of a rachis bearing two to four pairs of major leaflets, which may be sessile or definitely petiolate, a terminal leaflet usually larger than the lateral ones, and two to four pairs of minor leaflets alternating with the major ones. The reduced leaflets are usually less than one-fourth the size of the major leaflets, petiolate or usually sessile, and entire or somewhat toothed or lobed. The major leaflets are rarely entire; usually they are roundly toothed or lobed or even divided toward the base into sessile divisions or petiolate subleaflets, thus making the leaves incompletely bipinnate. Similarly the terminal leaflet may be entire, lobed, or divided.

This tendency on the parts of both the major lateral leaflets and the terminal leaflet to become compounded at their bases indicates the manner in which the leaves became compound originally. Apparently they arose from a simple leaf type, which became lobed basally while still retaining an entire apical region. Eventually the lobing became sufficiently pronounced to produce divisions on each side of the base of the leaf, each division carrying one of the lateral pinnate veins of the original simple blade. This tendency continued until several pairs of divisions were produced, and further reduction in leaf surface resulted in marked reduction in the size of alternate pairs of divisions. At this point there was a tendency toward stabilization, and the typical *Lycopersicon* leaf became relatively fixed. That the character is not a thoroughly fixed one is indicated in *L. peruvianum* var. *dentatum* in which both the major lateral leaflets and the terminal leaflet are divided basally or throughout into divisions that may be again lobed or divided. The seedling of *L. esculentum* illustrated in plate 8, *M*, in its relict simple leaves and later compound ones, is indicative of the manner in which the compound leaves of *Lycopersicon* were developed.

PUBESCENCE.—No species of *Lycopersicon* so far known is totally glabrous. Few forms show any tendency to have any whole set of organs (such as stems, leaves, peduncles, etc.) glabrous, but in some the pubescence may be reduced to a very inconspicuous puberulence in the form of irregular granular or aborted hairlike epidermal excrescences. Mixed with such puberulence may be somewhat more elongate, simple, unicellular hairs up to one-tenth of 1 mm. in length. Another common type of hair is an elongated septate structure up to 2 or 3 mm. in length, gradually tapering from the base to the exceedingly attenuate apex. Rarely this type may have the apical cell proliferated by 8 or 10 minutely slender branches to form a capitate stellate cluster at the end of the whiplike hair.

Glands are not uncommon. Sometimes the puberulence or the simple unicellular hairs may be irregularly glandular on the surfaces. A common form is a capitate gland on either the elongated unicellular hairs or the septate type. In either form the gland appears to be a resinous body with four round lobes superimposed upon a fifth lobe, which functions as a connective with the apex of the hair.

Puberulence occurs on almost all above-ground parts of the plant save the inside of the corolla, the pistils and fruits of some species, and the anther sacs (except along their lateral edges). More elongate simple hairs are common on stems, leaf blades, and calyx lobes. Septate hairs are common on stems, leaf rachises, peduncles, and raceme axes. Stipitate glands, with either unicellular or septate stipes, occur usually on only the stems, leaf rachises, raceme axes, pedicels, and calyx lobes of some species. The fruits of some species are glabrous, some puberulent, and some pubescent or hirsute. The various types of hairs are illustrated in plate 8, *D* to *L*.

INFLORESCENCE.—The inflorescence is typically lateral, arising from the stem opposite a leaf attachment or not associated with a leaf; occasionally it may be terminal, and it may become proliferated with a vegetative shoot. In the primitive type the inflorescence is a cyme consisting of a naked peduncle basally subtended by a pair of foliar bracts, bearing 2 racemes which are again basally subtended by 1 or 2 foliar bracts. The racemes bear two-ranked pedicels each of which is subtended by a foliar bract and articulated at or above the middle. This type of inflorescence is characteristic of *L. peruvianum*, but in some of its forms and in some of the associated species the bracts may be reduced and some or all of the bracts may be totally lacking. In the cultigen and in *L. pimpinellifolium*, on the other hand, the inflorescence is reduced to a simple raceme totally lacking bracts. That the reduction of the inflorescence to a single raceme and the total loss of bracts represents an advanced condition in the genus is indicated by the behavior of such forms under unusually favorable greenhouse conditions. *L. pimpinellifolium*, if grown in the field, ordinarily produces a simple raceme about 1 dm. in length and 12- to 18-flowered. In the greenhouse the plant grew prodigiously and produced an inflorescence 1½ m. in length bearing 100 to 150 flowers. This inflorescence usually branched several times and produced a number of large foliar bracts. The close resemblance of these abnormalities (excepting the size) to the normal inflorescence of *L. peruvianum* leads to the obvious conclusion that the inflorescence type has progressed by reduction from the *peruvianum* type to the *pimpinellifolium* type

just as by reduction of leaf surface the pinnate-leaf type is assumed to have evolved from a simple-leaf type. The raceme of the cultigen, *L. esculentum*, in many varieties has been reduced still further and has become a short raceme of ordinarily only 5 or 6 flowers. The principal types of inflorescences, in fruiting stage, are illustrated in plate 1.

FLOWERS.—Ordinarily the species of *Lycopersicon* bear only 5-merous flowers with bicarpellate ovaries. However the cultigen, *L. esculentum*, usually has the calyx and carpels multiplied, and sometimes also the corolla and stamens. Occasional tricarpetate ovaries occur in other species, especially *L. hirsutum*, but the cultigen is apt to produce fruit with 6 to 15 or more cells.

The calyx of *Lycopersicon* is gamosepalous only at the base. The five equal lobes are usually narrowly lanceolate and acute, tend to be pubescent and many glandularly so, and are markedly accrescent in fruit. In some species the lobes are erect or spreading, but in a few they are markedly reflexed.

The corolla is gamopetalous, yellow, regular, and rotate. The tube is very short or indistinguishable, the limb shallowly or deeply divided into five spreading or reflexed lobes. Occasionally the tendency to reflex may include the whole limb thereby turning the corolla inside out. The whole corolla is glabrous except that part of the dorsal surface of each lobe that is exposed in the bud.

The stamens are equal and inserted in the very short corolla tube or at the base of the almost tubeless corolla. The filaments are very short, seldom as much as 1 mm. long, and sometimes apparently lacking. The elongated anthers, borne on free filaments, are connate into a tube or column surrounding the pistil. Each anther consists of two oblong anther sacs prolonged into a flat, elongated, sterile appendage. Both the sacs and the appendages are closely connate to form the column. The sacs form a fusiform body much thicker than the appendage tube so that the whole column forms a bottle-shaped or tenpin-shaped structure. In some forms this column is strongly bent to one side. The anther sacs are dehiscent from the apex toward or nearly to the base along the inner surface. This character distinguishes the genus from *Solanum*, the species of which have the anther sacs dehiscent by an apical pore that later is sometimes prolonged into a short downward slit reaching not more than one-third the distance to the base. In *Lycopersicon* there is no apical pore, and the slit reaches at least two-thirds the distance to the base.

The pistil normally consists of a glabrous or hairy ovary with two or rarely three cells (or more in the cultigen), an elongated style reaching the tip or exerted from the staminal tube as much as 2 mm., and a capitate, simple, narrow, or somewhat bulbous stigma. Practically no variation of taxonomic significance other than pubescence and number of carpels is recognizable in the pistil.

FRUIT.—All species of *Lycopersicon* have fleshy berries with central placentae produced by the locular partitions, each placenta centrifugally directed. In *L. esculentum* and *L. pimpinellifolium* the fruits are glabrous and red or yellow. In the other species they are greenish white and marked with lines or irregular blotches of lavender, particularly on the surface exposed to the sun. Those with definite lines have these arranged along the middorsal line of each locule wall, extending from the apex toward the base. In these white-fruited species the berries are pubescent, ranging from sparingly short-pubescent to markedly hirsute with prominent, elongated, coarse, septate hairs. The

two- and three-locular fruits of the wild species are globose and less than 3 cm. in diameter. The cultigen produces all manner of variations in size, shape, and number of locules, ranging from small, pyriform, two-celled fruits to depressed, multilocular, ridged and lobed fruits up to a decimeter in diameter.

SEEDS.—In most species the seeds are very numerous in each berry, but in *L. cheesmanii* there are usually only about 8 or 10. In all species the seeds are loosely enveloped in a mucilaginous sheath or matrix. In the yellow- and red-fruited species (less strikingly so in *L. pimpinellifolium*) the seed body is flattened, obovate in shape, obviously pubescent with silky hairs, particularly around the periphery, and light brown. (These latter characters are obvious only when the seeds are dried and cleaned of the sheath. These hairs have been termed "false hairs," but for the sake of brevity the distinction is here omitted.) In the white-fruited species the seed body is thickened, broadly oblanceolate in outline, glabrous save at the very apex, and light or dark brown. The size of the seeds varies in proportion to the size of fruit produced by the various species.

SPECIES CONCEPT

The six species of *Lycopersicon* here recognized are represented by typical forms that differ from one another as widely as would be demanded by the most conservative systematist. In fact, the same statement could be made with little modification concerning two entities that are being treated as subspecific. If that condition were a full statement of the situation, no study such as the present one would be necessary, but, unfortunately, the forms representing the easily separable extremes or "typical" forms of the species and varieties do not stand distinct from one another. They are all connected by intergrades, some of which are more abundant than the extreme forms on which the early names were based. Thus, by applying the arbitrary rule that two species are not tenable unless absolutely distinct and unconnected by intergrades, one could find some justification for the rather academic opinion that "there is only one species of tomato." Since taxonomy is not an end in itself, and since the classification of economically important groups is particularly entrained by the requirements of convenience, the multitudinous variations of the tomatoes cannot be dismissed by lumping them into a monotypic genus. Particularly is this mandatory when one considers, for instance, that although species A is not distinct from species B, species B not distinct from C, C not from D, etc., species D is only remotely related to species A and must for all purposes, genetic, horticultural, and academic alike, be held a separate entity.

A careful examination of a large number of specimens soon revealed the fact that there exist no constant characters by which the species may be distinguished in the conventional taxonomic manner. Leaf size and shape, pubescence, size and form of corolla, fruit form and color, and pubescence and form of seeds, as well as dozens of other characters were examined and found inconstant within the species. Even more confusing is the obvious overlapping of two or more species by each character. This confusion of characters combined with the abundance of intergrades between obviously different species has resulted in real difficulty in drawing up descriptions and a key of diagnostic value.

Two courses were open in the taxonomic treatment. The various species might have been split into their numerous components until every minor form had been raised to specific rank. Such a procedure would have resulted in the description of innumerable species. However, such "species" are even more difficult to key out than the variable complex ones, and the classification would be useless from a practical standpoint. The more conservative course (the one here followed) necessitated the recognition of a wide latitude of intraspecific variation. Though this procedure has no basis in biometrics and does not yield distinct and nonoverlapping species, it does yield entities which, it is believed, can readily be recognized (with a little study) by workers other than a specialist in the taxonomy of *Lycopersicon*. A middle course between these extremes proved impossible for lack of natural group limits, such limits, in the taxonomic sense, being found to exist only for the somewhat larger and more complex groups here separated. Thus the classification of groups has been based not upon single key characters, but upon relationship as indicated by general aspect or a combination of characters. In that connection it might be well to call to mind the fact that all conservative treatments of such groups of indistinct species as *Iris*, *Quercus*, *Crataegus*, *Rubus*, *Rosa*, *Astragalus*, etc., have been for the most part based upon such a "feeling" for relationships through general aspect, and most cases of extreme splitting in these groups can be attributed to a denial of such relationships and a dependence upon apparent but unreliable key characters.

The six species, three varieties, and three forms named below represent the variations recognizable from a taxonomic viewpoint. The intraspecific and intravarietal variability admitted for most of these entities embraces numerous forms of about the rank known as horticultural varieties. No attempt has been made to classify these forms, because it is regarded as the work of the practicing horticulturist to apply names to such fine divisions of species.

Attention should be called to the high degree of variation induced by cultural conditions. Many of the clearly recognizable forms, if grown in a greenhouse of high temperature and relative humidity, lose their individuality in a weedy growth. Reference is made above to the development of bracted and forking inflorescences by the normally racemose and ebracteate *Lycopersicon pimpinellifolium*. Cultural studies of classification, therefore, whether dealing with botanical species and subspecies or with horticultural varieties, should be based upon plants grown under relatively uniform conditions in the field and should be checked against authentic duplicates collected in the native habitats.

SYSTEMATIC TREATMENT

Lycopersicon Mill., Gard. Dict. Abr. ed. 4. 1754.

Solanum (Tourn.) L., Sp. Pl. 184. 1753. (Pro parte.)

Lycopersicum Hill, Veg. Syst. 9:32. 1765.

Amatula Medic., Ueber Geschl. Malvenfam. 106. 1787.¹⁴

Solanopsis Börner, Abhandl. Naturwiss. Ver. Bremen 21 (2): 282. 1913. (Pro parte.)

¹⁴ Credited in Index Kewensis to Medic., Bot. Beobacht. 38. 1782. This error no doubt arose through Medicus' citation of his fig. 38 in the Beobachtungen of 1782, but the name *Amatula* does not occur in that volume.

Annual, biennial, or perennial herbs. Stems erect, procumbent or vining. Leaves alternate, typically pinnately divided, or interrupted-pinnate with large and small pairs of leaflets alternating, or bipinnate by the division of the major leaflets. Inflorescence an extra-axillary raceme or furcate cyme, bracted at the base of the peduncle, at the furcation, and at the base of each pedicel, or the bracts wanting; pedicels articulated near the middle or above. Calyx united below, divided nearly to the base into five (or rarely more) usually lanceolate divisions, frequently accrescent in fruit. Corolla yellow, gamopetalous, the tube very short, the limb shallowly or deeply divided into five (or rarely more) lanceolate or triangular lobes, these (and usually the undivided portion of the limb) strongly reflexed. Stamens five (or rarely more), sessile or with very obscure filaments broader than long; anther sacs linear-oblong, apically appendaged with ligulate sterile structures, dehiscent on the inner surface by longitudinal slits starting at the apices of the sacs and extending at least two-thirds the distance to the bases, the anthers more or less firmly joined into a bottle-shaped tube enclosing the pistil. Pistil of two (or rarely more) carpels united; ovary globose, pubescent or glabrous; style elongate, scarcely or obviously exerted from the stamen tube; stigma capitate, simple. Fruit a berry of two (or rarely more) locules, the placentae on the central axis formed by the locular partitions, several to many seeded, very fleshy, from globose and small to depressed, elongated, and variously lobed and very large, glabrous to puberulent or hispid, red to reddish yellow or greenish white with purple markings. Seeds obovate and flat to oblanceolate and thickened, glabrous save the apical periphery to lanate all over with silky hairs (when cleaned and dried), each enclosed in a mucilaginous sheath of twice the dimensions of the seed.

Type species: *Lycopersicon esculentum* Mill., Gard. Dict. ed. 8. 1768. *Lycopersicon* No. 2. [= *Lycopersicon lycopersicon* (L.) Karst., designated as type by Britton and Brown III. Fl. 3: 167-168. 1913. = *Lycopersicum lycopersicum* (L.) Karst. = *Solanum lycopersicum* L.]

KEY TO THE SPECIES

- Fruit usually glabrous, red or reddish yellow; seeds flat and broad, obviously hairy or not; inflorescence bractless and leaves without pseudostipules.....Subgen. I. *Eulycopersicon*.
- Inflorescence a short raceme; fruit 3 cm. or more in diameter, two- to several-celled, depressed or pyriform (cultigens).
- Fruit depressed, several-celled, usually lobed.....1. *L. esculentum*.
- Fruit pyriform, two-celled, not lobed.....1a. *L. esculentum* f. *pyriforme*.
- Inflorescence an elongate raceme; fruit 1 to 2 cm. in diameter, two-celled, spherical.
- Flowers medium-sized; corolla divided halfway to the base into triangular lobes; fruit 1.5 to 2 cm. in diameter.
- 1b. *L. esculentum* var. *cerasiforme*.
- Flowers small; corolla deeply divided into attenuate lobes; fruit about 1 cm. in diameter.....2. *L. pimpinellifolium*.
- Fruit usually hairy, white, green, or yellowish, frequently lavender or purple striped; seeds thick, naked, brown; inflorescence bracted and leaves usually with pseudostipules (except in *L. cheesmanii*).
- Subgen. II. *Eriopersicon*.
- Plants canescent with short hairs.
- Bracts lacking (Galápagos Islands).
- Leaflets entire or sinuate-dentate.....4. *L. cheesmanii*.
- Leaflets or some of them basally divided or compounded.
- 4a. *L. cheesmanii* f. *minor*.

Fruit usually hairy, etc.—Continued.

Plants canescent with short hairs—Continued.

Bracts present, subtending peduncles, rachises, and usually the pedicels (continental).

Stems various in habit; minor leaflets usually present; major leaflets lobed or if entire then suborbicular.

Major leaflets entire or merely toothed or shallowly lobed, truncate at base, subsessile-----3. *L. peruvianum*.

Major leaflets deeply lobed or pinnatifid, the whole leaf therefore somewhat fernlike, or if leaflets subentire, then long-petiolate and cordate.

3a. *L. peruvianum* var. *dentatum*.

Stems decumbent, densely very short-hairy; minor leaflets usually lacking; major leaflets entire, ovate-lanceolate.

3b. *L. peruvianum* var. *humifusum*.

Plants green in spite of the dense, long, spreading pubescence.

Stems thick, erect; corolla limb flat, scarcely divided; fruit obviously and densely spreading-hairy.

Stems and leaves copiously hirsute-----5. *L. hirsutum*.

Stems and leaves sparingly hirsute---5a. *L. hirsutum* f. *glabratum*.

Stems vining, variously rising but not thick or erect; corolla limb divided halfway to base; fruit sparingly pubescent---6. *L. glandulosum*.

Subgenus I. *Eulycopersicon* C. H. Mull., *subgen. nov.*

Amatula Medic., Ueber Geschl. Malvenfam. 106. 1787 (as genus).

Fruit glabrous, red or yellow; seeds flat, obovate in outline, distinctly silky-pubescent, especially around the periphery.

Bacca glabra, rubra vel flava; semina plana obovata, praecipue margine sericeo-pubescentia.

Type species: *Lycopersicon esculentum* Mill.

1. *Lycopersicon esculentum* Mill., Gard. Dict. ed. 8. 1868. *Lycopersicon* No. 2.

Solanum lycopersicum L., Sp. Pl. 185. 1753 (pro max. parte).

Lycopersicon galeni Mill., Gard. Dict. ed. 8. 1768. *Lycopersicon* No. 1.

Lycopersicum solanum-lycopersicon. Index Kewensis error in citation of Hill, Hort. Kew. 148. 1768.

Lycopersicon solanum Medic., Bot. Beob. 1783:245. 1784.

Lycopersicon pomum-amoris Moench, Meth. 515. 1794.

Solanum luridum Salisb., Prodr. 134. 1796.

Solanum foliosum Link in Buch, Phys. Besch. Canar. Ins. 144. 1825.

Solanum lycopersicon Blanco, Fl. Filip. ed. 1. 134. 1837.

Lycopersicum philippinarum Dun. in DC. Prodr. 13¹:27. 1852.

Solanum pimpinellifolium Mill. ex Dun. in DC. Prodr. 13¹:25. 1852. (Herbarium name cited as synonym.)

Lycopersicum macrophyllum Guss., Enum. Pl. Inar. 230. 1854.

Lycopersicum lycopersicum Karst., Deutsch. Fl. 966. 1882.

Lycopersicon lycopersicon Britt. and Brown, Ill. Fl. 3:168. 1913.

Lycopersicum esculentum Bailey, Stand. Cycl. Hort. ed. 2. 1931. f. 2231. 1925.

Lycopersicum esculentum var. *grandifolium* Bailey, loc. cit. 1932. f. 2232.

Lycopersicum esculentum var. *validum* Bailey, loc. cit. 1931. f. 2233, No. 1.

Lycopersicum esculentum var. *vulgare* Bailey, loc. cit. 1931. f. 2233, No. 2.

Annual, biennial, or perennial herbs. Stems 0.2 to 2 m. long, thick and succulent, puberulent to pilose or hirsute, with jointed simple hairs, occasionally glandular with capitate hairs, particularly near the growing tip. Leaves large, 10 to 30 cm. long, 6 to 15 cm. broad, ovate to lanceolate in outline, interrupted-pinnate to twice-pinnate, without pseudostipules at bases of petioles, major leaflets in 2 to 4 pairs, petiolate, entire to lobed or pinnately divided with sessile or petiolate divisions, 3 to 10 cm. long, 1.5 to 6 cm. wide, ovate to lanceolate, the minor leaflets 0.2 to 2 cm. long, oval to lanceolate, entire, sessile or petiolate, occasionally wanting, the whole leaf puberulent, the rachis sometimes pilose and glandular with capitate hairs like the stem, the blades dark green and puberulent above, densely puberulent to appressed tomentose beneath. Racemes usually simple or sometimes furcate, the peduncles 1 to 6 cm. long, puberulent and usually pilose and glandular, 4- or 5- to 10-flowered, the pedicels 10 to 15 mm. long, glandular, puberulent and pilose, articulate at or above the middle. Calyx 5- to 8- or 10-parted nearly to the base, the lobes subulate, attenuate, about 1 cm. long, 1 mm. wide or broader, densely glandular-puberulent and pilose. Corolla lemon yellow, 5- to 8- or 10-parted three-fourths the distance to the base, the lobes very narrowly lanceolate, reflexed, about 1 cm. long, puberulent along a median dorsal line toward the apex. Stamens 5 to 8 or 10, the staminal column irregular and usually disintegrating into groups of 2 or 3 stamens at anthesis, the anthers subsessile, anther sacs about 5 mm. long, the appendages about 2 mm. long. Style slightly exerted; ovary glabrous. Fruit 3 to 10 cm. in diameter or more, 3 to 10 locular or more, globose, depressed, or irregular, usually several-lobed, red or yellowish, glabrous. Seeds flat, oval, 3 mm. long, 2 to 2.5 mm. wide, densely lanate with silvery hairs. (Pl. 2, pl. 3. *A* to *G* and *K*, and pl. 8, *M*.)

Type locality: "in America calidiore" (Dunal).

CHILE: Valparaíso, 1895, *Buchtien* without number (G, US).

ARGENTINA: Tucumán, February 17, 1938, *Blood* and *Tremelling* 354 (USNA).

BRAZIL: Caldas, Provincia de Minas Geraes, 1859, *Regnell* 993 (US).

BOLIVIA: Tarija, February 11, 1938, *Blood* and *Tremelling* 303 (USNA); La Paz, June 3, 1906, *Buchtien* 116 (US); October 10, 1921, *Buchtien* 255 (G); Chulumani, January 20, 1938, *Blood* and *Tremelling* 228 (USNA); between Chulumani and La Paz, January 21, 1938, *Blood* and *Tremelling* 239 (USNA); "tropical region," November 1907, *Buchtien* 1455 (US).

PERU: Ayacucho (fruit purchased in market November 30, 1937), *Blood* and *Tremelling* 43 (USNA); Santa Ana, July 2, 1915, *Cook* and *Gilbert* 1603 (USNA); Departamento de Cuzco, October 1839–February 1840, *Cl. Gay* without number (G); Iquitos, Departamento de Loreto, August 2–8, 1929, *Killip* and *Smith* 27496 (NY, US); Departamento de Apurímac, Provincia de Abancay, May 1938, *C. Vargas* C. without number (USNA).

COLOMBIA: South of Tulue, May 5, 1938, *Blood* and *Tremelling* 734 (USNA).

VENEZUELA: Vicinity of Ciudad Bolívar, on the Orinoco, February 25, 1921, *Bailey* and *Bailey* 1246 (BH).

PANAMA.—CANAL ZONE: Ancón Hill, November 26–December 9, 1923, *Standley* 26399 (US).

HONDURAS: Vicinity of Tela, Departamento de Atlántida, December 14, 1927–March 15, 1928, *Standley* 53699 (F, US).

MEXICO.—YUCATÁN: Chichancanab, *Gaumer* 2272 (US, F); Mérida, 1900, *Rivas* 19 (F). QUERÉTARO: without locality, 1910–1913, *Arsène* 10585 (US).

WEST INDIES.—CUBA: Without collector or data (ANS). DOMINICAN REPUBLIC: *Poiteau* without number or data (ANS). MARTINIQUE: Cultivated, without locality 1884, *Duss* 2091 (NY, US). GUADELOUPE: 1892, *Duss* 2879 (F, NY, US); 1893, *Duss* 3785 (F, NY, US).

BERMUDA: Pembroke Parish, August 4, 1905, *Moore* 3168 (G).

UNITED STATES.—FLORIDA: Miami, November 22, 1912, *Small* 3876 (NY); November 1–30, 1904, *Small* 2198 (NY); Silver Palm School, Dade Co., November 24–27, 1904, *Small* 2191 (NY); Key West, December 16, 1913, *Small* and *Small* 4952 (NY). VIRGINIA: Glade Spring, August 25, 1908, *Rydberg* without number (NY); Chilhowie, August 4, 1892, *Small* without number (G). WEST VIRGINIA: Huttonsville, September 22, 1904, *Moore* 2446 (G). DISTRICT OF COLUMBIA: Washington, *Ward* without number (US). PENNSYLVANIA: near Philadelphia, August 2, 1877, *Redfield* without number (NY). RHODE ISLAND: Middletown, September 12, 1908, *Williams* without number (G). MASSACHUSETTS: Dedham, August 22, 1897, *Williams* without number (G); Milton, September 3, 1912, *Kennedy* without number (G, ANS). MAINE: Portland, August 3, 1910, *Williams* without number (G). MINNESOTA: Goodhue, August 1899, *Nelson* without number (US). INDIANA: “Miller’s,” August 26, 1898, *Umbach* without number (US). ILLINOIS: Chicago, September 1898, *Nelson* without number (US). ARIZONA: Paradise, Chiricahua Mountains, October 21, 1907, *Blumer* 2266 (US). CALIFORNIA: Ukiah, Mendocino County, June 20–July 3, 1898, *Chesnut* 362 (US). OREGON: Willamette River near Salem, July 29, 1923, *Nelson* 4900 (ANS). PORTUGAL: Porto, 1891, *Buchtien* without number (ANS). CANARY ISLANDS: Gran Canaria, April 1894, *Cook* 324 (US, G, NY), 748 (US). CHINA: Honan Island, Kwangtung Province, South China, March 9, 1917, *Levine* 1055 (G).

Lycopersicon esculentum is definitely a cultigen and in no sense of the word a natural “species” referable to a position in the phylogenetic arrangement of the other known species. Selection, cultivation, and probably hybridization have so changed its character that its wild form is recognized only with difficulty in its variety *cerasiforme*, discussed on page 13. The designation of this species as the type of the genus is in a way disadvantageous, as it does not occur wild except in a feral state and is the most varied form in the genus. However, the common edible tomato was widely known much earlier than the other species and was commonly used for food at the time Miller validated the genus in 1754, as is further indicated by his having applied to it the specific name *esculentum* as early as 1768. The species and its many derivations are still the most widely known forms in the genus.

The specific name *lycopersicum* L., though the first applied to this species since pre-Linnaean time, is considered repetitive of the generic name even in the form *Lycopersicon* of Miller. Therefore Miller’s specific name *esculentum*, the first published since Linnaeus’ name, must be regarded as the valid name of this species.

1a. ***Lycopersicon esculentum* f. *pyriforme*** (Dun.) C. H. Mull., comb. nov.

Solanum lycopersicum L., Sp. Pl. 185. 1753 (pro min. parte).

Solanum pomiferum Cav., Descr. Pl. 112. 1802.

Lycopersicum pyriforme Dun., Hist. Sol. 112. 1813.

Lycopersicum esculentum var. *pyriforme* Bailey, Stand. Cycl. Hort. ed. 2. 1931. 1925.

Erect or trailing herb, annual or biennial, in vegetative characters hardly distinguishable from the species. Flowers rarely more than five-merous. Fruit two locular, pyriform, the neck end much narrowed or only slightly so, red or yellow. (Pl. 3, *H* to *J*.)

Type locality: “Ex America australe, in hortis botanicis cultum.”

PARAGUAY: (stock from Paraguay cultivated at Cornell Univ. Expt. Sta.), September 27, 1891, *Bailey* without number (NY).

BRAZIL: Rio de Janeiro, December 22, 1923, *Bailey* and *Bailey* 288 (BH).

PERU: Ayacucho, November 30, 1937, *Blood* and *Tremelling* 45 (USNA).

WITHOUT LOCALITY: "Ex Cons. Bot. Genevensi (Herb. Prodr. De Candolle)," photograph without further data (F).

This form, like the species, is a cultigen, but it is much less commonly encountered. There is considerable evidence to indicate that the fruit shape that sets off this form from the species and from the following variety is only a simple mutation involving one or a few genes. The entity might perhaps as well have been regarded merely as a horticultural variety and not distinguished here. The variation probably arose from the wild prototype of the species rather than from the cultigen, but its habit resembles more closely that of the latter.

1b. *Lycopersicon esculentum* var. *cerasiforme* (Dun.) A. Gray, Syn. Fl. 2¹: 226. 1886.

Solanum lycopersicon var. L., Sp. Pl. 185. 1753.

Solanum pseudo-lycopersicum Jacq., Hort. Vindob. 1: 4. 1770.

Amatula flava Medic., Ueber Geschl. Malvenfam. 106. 1787.

Solanum spurium Gmel., Syst. Nat. 2: 384. 1796.

Solanum pseudo-lycopersicum Willd., Sp. pl. 1: 1034. 1797.

Solanum humboldtii Willd., Hort. Berol. 1: 27. 1804.

Lycopersicon humboldtii Dun., Hist. Sol. 112. 1813.

Lycopersicon regulare Dun., Syn. Sol. 3. 1816.

Lycopersicon spurium Link, Handb. 1: 566. 1829.

Annual or biennial herb, vining, the branches more slender than in the species. Leaves typically large, 15 to 25 cm. long, 8 to 15 cm. wide, ovate to ovate-lanceolate in outline, interrupted-pinnate, without pseudostipules at bases of petioles, all leaflets petiolate, the major ones about 4 pairs, ovate to lanceolate, cordate or rounded at base, at apex acute, subentire or basally lobed to divided or repandly toothed, about 2.5 to 7 cm. long and 1 to 3 cm. wide, the minor leaflets subrotund to lanceolate, subentire, obtuse to acute, about 0.5 to 1.5 cm. long. Flowers apparently always 5-merous, 5 to 10 in a short raceme. Calyx about 5 mm. long, markedly accrescent in fruit. Corolla about 1 cm. long, divided into lobes 6 mm. long, these narrowly lanceolate and reflexed as in *L. pimpinellifolium*. Staminal column narrowly bottle-shaped, the combined anther sacs about 2 mm. thick. Fruit 2-celled, globose, about 1.5 to 2.5 cm. in diameter, red or yellow. Seeds as in the species, or somewhat smaller, less flattened, and the pubescence confined to the periphery. (Pl. 3, *L*, and pl. 4.)

Type locality: "in maritimis Peruviae."

CHILE: West of Vallenar, March 19, 1938, *Blood* and *Tremelling* 448 (USNA).

BRAZIL: Açude Acarape do Meio, Mun. de Redenção, Ceará, September 14, 1935, *Drouet* 2472 (G); Açude Cedro, Mun. de Quixadá, Ceará, August 31, 1935, *Drouet* 2396 (G); without locality, *Blanchet* without number (photo. ex Cons. Bot. Genevensis) (F).

PERU: Near La Merced, December 2, 1937, *Blood* and *Tremelling* 49 (USNA); Perene Colony east of La Merced, December 2, 1937, *Blood* and *Tremelling* 50, 52, 53 (USNA); between Huanuco and Tingo Maria, December 5, 1937, *Blood* and *Tremelling* 62 (USNA); near Tingo Maria, December 6, 1937, *Blood* and *Tremelling* 68, 70 (USNA); Pacasmayo, December 19, 1937, *Blood* and *Tremelling* 120 (USNA); Quillabamba, January 11, 1938, *Blood* and *Tremelling* 178 (USNA); Abancay, January 15, 1938, *Blood* and *Tremelling* 202 (USNA); Talara, Provincia de Paita, September 13, 1925, *Haught* 2 (US); Tarapoto, 1855-1856, *Spruce* 4143 (F, G).

ECUADOR: Quito, April 8, 1938, *Blood* and *Tremelling* 564 (USNA); west of Guayaquil, April 10, 1938, *Blood* and *Tremelling* 579 (USNA); near Santa Rosa, Provincia de El Oro, April 12, 1938, *Blood* and *Tremelling* 584, 587 (USNA);

Pasaje, Provincia de El Oor, April 12, 1938, *Blood* and *Tremelling* 591, 593, 604 (USNA).

COLOMBIA: Pusillo, between El Bordo and Dolores, April 27, 1938, *Blood* and *Tremelling* 671 (USNA); Candalaria, Rio Cauca Valley, May 5, 1938, *Blood* and *Tremelling* 735 (USNA).

VENEZUELA: Vicinity of Caracas, January 10, 1921, *Bailey* and *Bailey* 843 (BH).

COSTA RICA: San José, January 1924, *Alfaro* 32417 (US); February 1924, *Standley* 34768 (US); Alto de Ochomogo, December 1896, *Tonduz* 10403 (US).

HONDURAS: Hacienda La Zumbadora, Departamento de Copan, May 12, 1919, *Blake* 7384 (US); Cuyamel, July 27, 1923, *Carleton* 484 (US); Swan Islands (off coast of Honduras), April 7, 1913, *Nelson* 48 (G).

EL SALVADOR: San Salvador, May 1922, *Calderon* 749 (G, US); December 20, 1921-January 4, 1922, *Standley* 19621 (G, US); San Miguel, Departamento de San Miguel, February 24-27, 1922, *Standley* 21093 (G, US); San Martin to Laguna de Ilopango, Departamento de San Salvador, April 1, 1922, *Standley* 22549 (G, US).

GUATEMALA: Vicinity of Quirigua, Departamento de Izabal, May 15-31, 1922, *Standley* 24072 (NY, US); Los Amates, Departamento de Izabal, May 9, 1919, *Blake* 7286 (US); Laguna de Guija, Departamento de Jutiapa, April 1894, *Heyde* and *Lux* 6360 (F, G, NY, US); Volcan Imay, Departamento de Jalapa, January 8, 1908, *Kellerman* 7694 (NY); Gualan, Departamento de Zacapa, December 30, 1905, *Kellerman* 5706 (US).

MEXICO.—YUCATAN: Kancabconot, May 1917, *Gaumer* 23882 (F, US); San Anselmo, *Gaumer* 1230 (F, US); Izamal, 1917, *Gaumer* 23913 (F); Chichen Itza, January 20, 1895, *Millspargh* 141 (F, G). VERA CRUZ: Coatzacoalos, Isthmus of Tehuantepec, March 8, 1895, *Smith* 1073 (US). OAXACA: Yalalag, February 8, 1919, *Reko* 4032 (US); Ubero, April 1937, *Williams* 9080 (F). NAYARIT: Tres Marias Islands, Maria Madre Island, May 15, 1897, *Maltby* 115 (US). SINALOA: Vicinity of San Blas, March 24, 1910, *Rose*, *Standley*, and *Russell* 13390 (NY, US); vicinity of Fuerte, March 25, 1910, *Rose*, *Standley*, and *Russell* 13465 (US); vicinity of Mazatlan, March 30, 1910, *Rose*, *Standley*, and *Russell* 13647 (US); vicinity of Culiacan, April 2, 1910, *Rose*, *Standley*, and *Russell* 14962 (US). SONORA: Salitral, Rio Mayo, February 4, 1934, *Gentry* 1266 (F). TAMAULIPAS: Tampico, 1827, *Berlandier* 22 (F); "Rio Grande, Texas-Mexico," 1834, *Berlandier* 2405 (NY, US); "Texas-Mexico" *Berlandier* 975 (US).

WEST INDIES.—TRINIDAD: Penal Rock Road, March 28, 1920, *Britton*, *Hazen*, and *Mendelson* 1089 (G, NY, US). PUERTO RICO: Rio Piedras, March 2, 1916, *Stevenson* 3954 (US); Isabel Segunda, Vieques Island, February 16, 1914, *Shafer* 2916 (NY, US); without locality, March 20, 1927, *Britton* and *Britton* 9040 (NY); February 7, 1885, *Urban* 784 (US). HAITI: St. Michel de l'Atalaya, Department du Nord, December 26, 1925, *Leonard* 8479 (US); Plaisance, Department du Nord, January 28, 1926, *Leonard* 9385 (US); without locality, February 13, 1926, *Ekman* 5535 (US). JAMAICA: Newcastle, September 9, 1908, *Britton* 3307 (NY); without locality, August 3, 1915, *Harris* 11896 (F, G, NY, US). CUBA: Batabano, Provincia Habana, March 28, 1929, *Bailey* 12553 (BH); vicinity of Matanzas, March 16, 1903, *Britton*, *Britton*, and *Shafer* 364 (NY); Rio Damjui, Rodas, Distrito de Cienfuegos, Provincia de Santa Clara, June 20, 1895, *Combs* 225 (F, G, NY); "Nipe Bay, Oriente," May 4, 1909, *Shafer* 1819 (F, NY).

UNITED STATES.—TEXAS: Brownsville, Cameron County, May 12, 1919, *Hanson* 459 (NY, US); August 1-5, 1921, *Ferris* and *Duncan* 3184 (NY); October 29, 1927, *Rose* and *Russell* 24288 (US); between Orange and the Sabine River, April 11, 1925, *Small* and *Wherry* 11788 (NY). FLORIDA: near Brighton, October 1, 1929, *Bailey* without number (BH); near Lake Okeechobee, May 9-10, 1917, *Small* 8256 (NY); June 5, 1907, *Fredholm* 5842 (G); March 17, 1925, *Bailey* and *Bailey* 6493 (BH); Tarpon Springs, March 1921, *Beckwith* 779 (US); Key Largo, January 10-11, 1909, *Small* and *Carter* 2914 (NY—erroneously numbered 87 in ANS); Osprey, March 10, 1904, *Smith* 991 (ANS). MASSACHUSETTS: Cambridge, September 19, 1910, *Williams* without number (G).

CHINA: Canton University, Kwantung Province, November 28, 1917, *Levine* 1888 (G).

SUMATRA: Adian Rindang, Asahan, vicinity of Hoeta Tomoean Dolok, November 17-December 10, 1935, *Boeca* 8535 (G).

PHILIPPINE ISLANDS: BALABAC, March-April 1906, *Manqubat* 386 (US). LUZÓN: Antipolo, Province Rizal, October-December 1925, *Buensuceso* without number (ANS); Province Nueva Vizcaya, January 1913, *McGregor* 20139 (US);

Montalban, Province Rizal, June 1908, *Ramos* 5211 (G); Bágúio, Benguet Province, May 1914, *Merrill* 14 (G); January 19–February 26, 1903, *Topping* 8 (US).
 HAWAIIAN ISLANDS: Punchbowl, island of Oahu, March 25, 1895, *Heller* 1998 (G, ANS, US); June 19, 1916, *Hitchcock* 13837 (US).

In the opinion of the writer *Lycopersicon esculentum* var. *cerasiforme*, the cherry tomato, is the form from which the cultivated tomato originated, save that some cultivated varieties probably arose as hybrids of this form with other species. The tendency of the cultigen in a feral condition to assume the form of this variety is indicative of such a relationship. This variety is widely cultivated among less advanced peoples in spite of the very inferior fruit it produces. It is difficult to believe that in all of its wide distribution it was introduced in its present condition. Doubtless in some places it was introduced in the form of a poor grade of the cultigen that typifies the species and has since reverted to the wild type.

2. ***Lycopersicon pimpinellifolium*** (Jusl.) Mill., Gard. Dict. ed. 8. 1768. *Lycopersicon* No. 4.

Solanum pimpinellifolium Jusl. in L., Cent. 1. Pl. 8. 1755. Reprint in L., Amoen. Acad. 4: 268. 1759.

Lycopersicum inodorum Juss. ex-Steud. Nom. Bot. ed. 1. 1: 500. 1821. (As synonym.)

Lycopersicum racemigerum Lange, Ind. Sem. Hort. Haun. 1865: 26. 1866.

Lycopersicum racemiforme Lange, Bot. Tidsskr. ser. 2. 1872: 189. 1872.

Annual or perennial, minutely puberulent. Stems prostrate, vine-like, 1 to 2 m. long, 2 to 3 mm. thick, the tips ascending, rarely somewhat pilose or glandular. Leaves 4 to 15 cm. long, 3 to 6 cm. wide, narrowly ovate in outline, interrupted-pinnate, pseudostipules lacking (sometimes apparently present as the result of buds in the axils of the leaves), the segments of two kinds, usually a single pair of small segments alternating with each pair of the larger ones, the larger segments 3-paired, 1 to 3 by 0.5 to 2 cm., lanceolate, ovate-lanceolate, or ovate, acute or obtuse, basally unequally cordate to simply rounded, subentire or slightly undulate, long- or short-petiolate (1 to 10 mm.), dark green above, grayish green beneath, minutely puberulent all over, smaller segments 1 to 10 by 1 to 7 mm., ovate to rotund, near the apex of the leaf somewhat reduced, sometimes wanting. Inflorescence glandular-puberulent, a simple raceme or rarely furcate toward the apex (not a furcation of a naked common peduncle), 12- to 30-flowered or more, the peduncle (below first pedicel) very short (5 to 30 mm., usually about 15), inflorescence in all 5 to 10 cm. long, the pedicels 2-ranked, alternate, very regularly spaced, 7 to 15 mm. long, filiform, articulate about 3 mm. below the flower, becoming 0.5 mm. thick in fruit. Calyx divided to the base into 5 lanceolate acuminate lobes 2.5 to 3.5 or 4 mm. long at anthesis and reflexed, glandular on both inner and outer surfaces and the outer surface sparingly pubescent with eglandular hairs. Corolla bright lemon yellow or slightly orange, 12 to 16 mm. broad, deeply divided into 5 narrowly lanceolate and long-attenuate lobes 6 to 8 mm. long, these puberulent dorsally along the median line exposed in the bud, the lobes strongly reflexed at anthesis. Anthers nearly sessile, the filaments hardly 0.25 mm. long, the staminal column bottle-shaped, 5 to 7 mm. long, the appendage tube slightly shorter

than the anther sacs, the whole mealy along the lines of fusion, the tube 0.5 mm. thick, the combined anther sacs 2 mm. thick or less. Style 7 to 9 mm. long, slightly exerted from the tube; ovary densely glandular hairy or puberulent, usually becoming glabrous with maturity. Fruit 2-celled, spherical, about 1 to 1.5 cm. in diameter, glabrous or sometimes hairy, shiny red or orange red, the raceme elongating to 15 or 20 cm., most flowers setting fruit, the calyx accrescent, finally 6 or 7 mm. long. Seeds thick, obovate, 3 mm. long, 1.5 to 2 mm. broad, naked save for the apex, minutely pitted. (Pl. 5 and pl. 3, *M.*)

Type locality: "in Peruvia."

PERU: Near Lima, November 24, 1937, *Blood* and *Tremelling* 6, 7, 8, 9, 10 (USNA); 10 miles east of Lima, December 8, 1937, *Blood* and *Tremelling* 76 (USNA); Pacasmayo (altitude 100 feet), December 14, 1937, *Blood* and *Tremelling* 82, 84 (USNA); near Trujillo (altitude 100-300 feet), December 15, 1937, *Blood* and *Tremelling* 93, 94, 95, 97 (USNA); December 16, 1937, *Blood* and *Tremelling* 102, 103, 105, 106, 107, 108 (USNA); December 18, 1937, *Blood* and *Tremelling* 114 (USNA); San Pedro, December 19, 1937, *Blood* and *Tremelling* 115 (USNA); Guadalupe (altitude 150 feet), December 19, 1937, *Blood* and *Tremelling* 123 (USNA); between Zaña and Chiclayo (altitude 100 feet), December 19, 1937, *Blood* and *Tremelling* 124 (USNA); Tambayeque (altitude 75 feet), December 19, 1937, *Blood* and *Tremelling* 127 (USNA); Quillabamba (altitude 3,650 feet), January 11, 1938, *Blood* and *Tremelling* 179, 180, 181, 182 (USNA); Santa Ana, June 21, 1915, *Cook* and *Gilbert* 1405 (ANS, BH, G, US); July 8, 1915, *Cook* and *Gilbert* 1702 (US); without exact locality, 1838-1842, *Wilkes Expedition* without number (NY).

ECUADOR: Provincia de Guayas, between Guayaquil and Salinas, April 8, 1938, *Blood* and *Tremelling* 561 (USNA); June 21-24, 1923, *Hitchcock* 20119 (G, NY, US); Quinta, April 8, 1938, *Blood* and *Tremelling* 563 (USNA).

GALÁPAGOS ISLANDS: Albemarle Island, July 1891, *Bauer* 188 (G); March 20, 1906, *Stewart* 3379, 3380 (G, NY, US); Hood Island, July 1891, *Bauer* 189 (G); May 1899, *Snodgrass* and *Heller* 741 (G); Indefatigable Island, October 27, 1905, *Stewart* 3375 (G); April 13, 1930, *Svenson* 281 (G); Santa Cruz Island, May 25, 1932, *Schimpff* 12 (NY).

Lycopersicon pimpinellifolium, the currant tomato, has been cultivated casually as an oddity. Its close relationship to *L. esculentum* is evidenced in its red glabrous fruit, lack of foliar pseudostipules, lack of bracts in the inflorescence, and the similarity of its habit, general aspect, and inflorescence to those of *L. esculentum* var. *cerasiforme*. From the latter it is readily distinguished by its more slender habit, more elongate racemes, and smaller fruit.

Subgenus II. Eriopersicon C. H. Mull., *subgen. nov.*

Ovary pubescent; fruit pubescent or hirsute, white or greenish white to yellowish, purple tinged, lined, blotched, or not; seeds thickened, oblanceolate in outline, glabrous or pilose only at the broad apex.

Ovarium pubescens; bacca pubescens vel hirsuta, alba vel subviridis vel subflava, saepius purpureo-tincta vel purpureo-lineata; semina crassa, oblanceolata, glabra vel apice pilosa.

Type species: *Lycopersicon peruvianum* (L.) Mill.

Name derived from erios, wool, and persicon, peach.

3. *Lycopersicon peruvianum* (L.) Mill., Gard. Diet. ed. 8. 1768.

Lycopersicon No. 5.

Solanum peruvianum L., Sp. Pl. 186. 1753.

Solanum peruvianum Jacq., Icon Pl. Rar. 2. t. 327. 1786-93.

(Erroneously cited as t. 337 in Index Kewensis.)

Solanum commutatum Spreng., Pl. Min. Cogn. Pugill. Prim.

1: 18. 1813.

Lycopersicon commutatum Roem. and Schult., Syst. Veg. 4: 569. 1819.

Lycopersicon peruvianum var. *commutatum* Link ex Klotzsch and Otto, Icon. Pl. Rar. 1: 87. pl. 35. 1841.

Solanum chrysobotrys Hort. Berol. ex Walp., Rep. Bot. Syst. 3: 100. 1844-45.

Perennial, decumbent vine. Stems slender, weak, but not prostrate, densely short-canescens or villous with simple, short, straight or curling, white or yellowish hairs, eglandular. Leaves oblong to lanceolate or narrowly ovate in outline, 4 to 9 cm. long, 2 to 4 cm. wide, interrupted-pinnate or simply pinnate, pseudostipules at bases of petioles similar to the leaflets or rarely reduced or wanting, the major leaflets 3 to 5 (usually 4) pairs, petiolate, elliptic-ovate or lanceolate, obtuse or acute, basally unequally rounded, subentire to erosely toothed or wavy, the minor leaflets (when present) ovate, subsessile, 1 to 5 mm. long, entire or erose, the whole leaf canescens or villous as the stem, the blades more densely pubescent beneath than above with whiter hairs. Inflorescence a cyme of two 6- to 12-flowered racemes or these again dichotomous (or rarely simple), on a naked common peduncle 3 to 10 cm. long, the racemes 5 to 9 cm. long, the pedicels 2-ranked, alternate, 5 to 12 mm. long at anthesis, articulate above the middle, the peduncles, rachises, and pedicels usually subtended basally by evident ovate to reniform, erose, sessile bracts 5 to 15 mm. in diameter or these reduced or wanting on the pedicels, the whole short-canescens or villous-canescens with simple hairs or rarely a few capitate stellate hairs. Calyx 5-parted nearly to the base into linear-lanceolate lobes 4 to 6 mm. long, the apices narrowly rounded, dorsally pubescent with simple, eglandular hairs. Corolla bright orange yellow, 10 to 13 mm. long, 5-parted halfway to the base into attenuately triangular lobes, markedly reflexed so that the limb is turned inside out, the lobes dorsally pubescent along a broad median line. Staminal column 6 to 9 mm. long, narrowly bottle-shaped, strongly bent to one side, subsessile, the combined anther sacs 4 to 6 mm. long, 1.5 to 2 mm. broad, 2 to 3 mm. long, about 0.75 mm. thick, somewhat mealy along the narrow lines of fusion. Stigma bulbous-capitate; style exerted about 1 to 2 mm.; ovary sparsely pubescent, particularly about the apex. Fruit globose or depressed-globose, 1 to 2 cm. in diameter, 2-celled, minutely hairy all over, whitish with lavender stripes from the apex passing vertically down a midlocular line. Seeds numerous, oblanceolate, thickened, naked save the apex, light brown, minutely pitted. (Pl. 6 and pl. 3, N.)

Type locality: "in Peru. D. Jussieu."

CHILE: Azapa Valley, near Arica, March 24, 1938, *Blood* and *Tremelling* 479, 483 (USNA); May 15, 1917 *Skottsberg* 1072 (NY); southeast of Arica, March 25, 1938, *Blood* and *Tremelling* 486 (USNA); Arica, October 1914, *Buchtien* without number (G); November 3, 1931, *Jaffnel* 1647 (G); October 19, 1932, *Jaffnel* 1715 (G).

PERU: Lima, July 4, 1914, *Rose* and *Rose* 18589 (NY, US); *Wilkes* without date or number (US); between Miraflores and Barranca, near Lima, November 23, 1937, *Blood* and *Tremelling* 5 (USNA); Pacasmayo, altitude 100 feet, December 14, 1937, *Blood* and *Tremelling* 83, 85, 86 (USNA); Chancay, altitude 300 feet, December 14, 1937, *Blood* and *Tremelling* 88 (USNA); Culebra, near Trujillo, altitude 200 to 300 feet, December 15, 1937, *Blood* and *Tremelling* 98, 99, 100 (USNA); Mollendo, altitude 1,000 feet, January 3, 1938, *Blood* and *Tremelling* 162 (USNA); Tambo, April 1, 1938, *Blood* and *Tremelling* 540 (USNA); Mollendo,

Departamento de Arequipa, October 16, 1925, *Johnston* 3557 (G); Obrajilla, *Wilkes Expedition* without date or number (G, US); "Peruvian Andes," August 29, 1887, *Safford* without number (NY); "Reguno Peruviano et Chilensi," 1778-1788, *Ruiz and Pavon* without number (F).

Lycopersicon peruvianum was chosen as the type of the subgenus because it was the first species described and because its characters differ most radically from those of *Eulycopersicon*. It is exceedingly variable and grades into the following variety very markedly.

The fruit of *L. peruvianum* and the other species of the subgenus *Eriopersicon*, though edible, are much less palatable than those of *Eulycopersicon*. It is significant that no species of *Eriopersicon* occurs spontaneously outside the Andes (except *L. cheesmanii* which is endemic to the Galápagos Islands), whereas the more palatable *Eulycopersicon* species are widely scattered through tropical North America and various parts of the Eastern Hemisphere. Only the less desirable *L. pimpinellifolium* has a limited range.

3a. ***Lycopersicon peruvianum* var. *dentatum*** Dun. in DC. Prodr. 13¹: 24. 1852. (*As Lycopersicum.*)

Lycopersicum dentatum Dun., Sol. Syn. 4. 1816.

Lycopersicum chilense Dun. in DC. Prodr. 13¹: 24. 1852.

Lycopersicon atacamense Phil., Fl. Atac. 42. 1860.

Lycopersicon pissisi Phil., An. Univ. Chil. 1861: 56. 1861. Reprint in *Linnaea* 33: 205. 1864.

Lycopersicom puberulum Phil., An. Mus. Nac. Chil. 1891: 63. 1891.

Lycopersicon bipinnatifidum Phil., Verhandl. Deut. Wiss. Ver. Santiago (Chile) 2: 108. 1890 (nomen nudum); et in An. Mus. Nac. Chile 1891: 63. 1891.

Plants densely canescent with short simple hairs as in the type, but more frequently having pilose, capitate, stellate, or capitate glandular hair types. Leaves usually lanceolate in outline, pseudostipules usually present and like the leaflets but sometimes wanting, the major leaflets usually acute, much lobed or finely dissected making the leaves bipinnate or rarely subentire and then unequally cordate. Inflorescence as in the type. Fruit with hairs longer and more prominent than in the type, usually few seeded and the seeds variable in size and shape. (Pl. 7, *A* to *E*, and pl. 3, *O*.)

Type locality: Cobija, Bolivia.

CHILE: Azapa Valley, near Arica, altitude 100 to 200 feet, March 24, 1938, *Blood and Tremelling* 477, 478, 480, 481, 482 (USNA); Chacasilla, southeast of Arica, altitude 300 feet, March 25, 1938, *Blood and Tremelling* 485, 487 (USNA); Lluta Valley between Lluta and Arica, altitude 100 to 200 feet, March 24, 1938, *Blood and Tremelling* 475, 476 (USNA); Azapa, near Arica, August 1925, *Werdermann* 706 (F, G, NY, US); Tocopilla, October 27, 1930, *Jaffnel* 1045, 1059 (G); Tacna-Arica region, April 1922, *Shepard* 281 (G, NY, US); Taltal, Provincia de Antofagasta, December 11, 1925, *Johnston* 5607 (G); Paposo, Provincia de Antofagasta, December 8, 1925, *Johnston* 5589 (G)—cultivated at Princeton, N. J., *Holmes* 791 (USNA); Tocopilla, Provincia de Antofagasta, October 18, 1925, *Johnston* 3606 (G).

BOLIVIA: Cobija, 1841, *Gaudichaud* without number (F, G—photo, G marked "isotype" of *L. chilense*); without definite locality, *Gaudichaud* 23075 (F—photo ex Cons. Bot. Geneva); without definite locality, *Gaudichaud* without number (F—fragment of inflorescence).

PERÚ: Between La Merced and Tarma, December 3, 1937, *Blood and Tremelling* 54 (USNA); Pacasmayo, December 14, 1937, *Blood and Tremelling* 77 (USNA); near Trujillo, altitude 6,000 feet, December 17, 1937, *Blood and Tremelling* 111 (USNA); Mollendo, altitude 1,000 feet, January 3, 1938, *Blood and Tremelling*

161 (USNA); Arequipa, altitude 8,000 feet, January 5, 1938, *Blood and Tremelling* 168, 169 (USNA); Tingo, near Arequipa, August 17, 1925, *Cockerell* without number (US); April 8, 1925, *Pennell* 13147 (USNA); Icaré, Río de Lomas, 1909-14, *Weberbauer* 5736 (G,US); Mount Estuquiña, northwest of Moquegua, March 22, 1925, *Weberbauer* 7445, 7449 (US); west of Tacna, March 26, 1938, *Blood and Tremelling* 508, 509, 510, 512 (USNA); between Buena Vista and Tacumba, altitude 1,000 feet, *Blood and Tremelling* 513 (USNA); east of Moquegua, March 27, 1938, *Blood and Tremelling* 515, 516 (USNA); west of Moquegua, March 27, 1938, *Blood and Tremelling* 514 (USNA); Tambo, April 1, 1938, *Blood and Tremelling* 537, 538, 539 (USNA).

ECUADOR: West of Guayaquil, April 10, 1938, *Blood and Tremelling* 580, 581 (USNA).

The extreme variability of this variety includes some forms so different from one another that it is difficult to regard them as conspecific when they are considered without reference to the other forms. However, between all such forms are found intergrades more numerous than the representatives of the extreme forms. Such total lack of distinction could not well be overlooked, although the distinction between the variety and the typical form of the species is upheld in spite of the occurrence of a few clearly intermediate individuals.

3b. *Lycopersicon peruvianum* var. *humifusum* C. H. Mull., var. nov.

Perennial, decumbent vine, densely very short-pubescent or puberulent all over, totally eglandular save the inflorescence. Stems 0.6 to 1.5 m. long, ascending only at the very tips, terete or round-grooved, slender, not rooting. Leaves ovate to lanceolate in outline, 5 to 9 cm. long, pinnate or interrupted pinnate, pseudostipules usually much reduced or wanting, the major leaflets 5 to usually 7, ovate or lanceolate, acute, unequally rounded at base, petiolate or sessile, sinuate or entire, 5 to 20 (usually about 10) mm. wide, 10 to 30 (usually about 20) mm. long, the minor leaflets 2 to sometimes 4 mm. long, minutely petiolate, but usually absent. Inflorescence a simple raceme borne laterally on the stem or 2 or more raceme branches terminating a stem, 10 to 15 cm. long, 5- to 10-flowered along the distal half its length, the peduncle and some of the pedicels having simple, petiolate, foliar bracts basally, these 5 to 15 mm. long, the pedicels 12 to 20 mm. long, articulated one-fourth to one-third the distance below the flower, very sparsely capitate-glandular, otherwise puberulent or short-pubescent like the stems and leaves. Calyx about 4 mm. long, divided nearly to the base into 5 narrowly lanceolate lobes, puberulent, occasionally glandular, and very sparingly spreading-hairy. Corolla light orange yellow, 18 to 22 mm. broad, divided into 5 triangular lobes 4 mm. long, the limb thus broad, the lobes reflexed, the whole glabrous within and densely short-hairy without. Staminal column broadly bottle-shaped, strong bent to one side, 7 to 9 mm. long, sessile, the anther sacs combined about 6 mm. long and 2 to 2.5 mm. thick, the appendage tube about 0.75 mm. thick and 2 to 3 mm. long. Stigma slightly exerted; ovary sparingly puberulent. Fruit depressed-subspherical, about 12 mm. in diameter, 2-celled, sparingly short-hairy, hard at maturity, whitish or yellowish with a diffuse lavender or dull purple stripe passing vertically around the berry in a middorsal line on the locular walls (in occasional 3-celled fruits this line is trifurcate from the stigmatic end, passing down the middle of each locular wall), the calyx accrescent to 8 or 10 mm. in length. Seeds numerous, oblanate, thickened, naked save the apex, light brown, minutely pitted.

Eglandulosum, inflorescentia excepta; rami procumbentes, foliola majora integra vel sinuata, ovato-lanceolata, acuta, minora saepissime nulla; inflorescentia bracteosa.

CHILE: Arica, near coast, September 1926, *Jaffnel* 25 (G).

PERU: Between San Juan and Magdalena, December 23, 1937, *Blood and Tremelling* 142 (type as sheet No. 40370, herbarium USNA); near San Juan, December 23, 1937, *Blood and Tremelling* 141 (USNA); near Piscocucho, January 12, 1938, *Blood and Tremelling* 184 (USNA).

This variety obviously belongs in the species *L. peruvianum*, but it tends strongly toward *L. cheesmanii*. From *L. cheesmanii* and the other forms of *L. peruvianum* it may be distinguished by the almost total lack of glands, the quite procumbent stems, the almost entire major leaflets, and the infrequent occurrence of minor leaflets.

This variety is clearly distinct from the typical form of the species; no intermediate forms have been seen. However, the minor nature of its differences suggests the advisability of according it only varietal rank.

4. *Lycopersicon cheesmanii* Riley, Bul. Misc. Inform. Kew 1925: 227. 1925. (As *Lycopersicum*.)

Lycopersicum peruvianum Mill., f. [1] Anderss., K. Vetensk. Akad. Handl. 1853: 216. 1855.

Procumbent or suberect perennial. Stems terete, rather slender, densely short-velvety with short capitate glandular and more prominent eglandular jointed hairs, or obviously short-pilose. Leaves interrupted-pinnate, 3 to 7 cm. long, oblong or lanceolate in outline, pseudostipules totally lacking, the leaflets of two orders, the major ones 3 to 4 pairs, petiolate, suborbicular to ovate, entire or wavy-margined, 5 to 10 mm. long, the minor ones suborbicular, sessile or short-petiolate, 1 to 2 mm. long, the whole leaf densely puberulent, the rachises and leaflet margins pilose with tapering jointed hairs and somewhat shorter stipitate glands. Inflorescence pilose and densely stipitate-glandular, a simple raceme 4 to 6 cm. long, 4- to 10-flowered, ebracteate, but occasionally a pedicel replaced by a pinnate foliage leaf, the pedicels 8 to 10 or 12 mm. long, articulated scarcely above the middle or near the receptacle, spreading at anthesis, frequently abruptly reflexed on the rachis in fruit, accrescent in diameter but not markedly in length at maturity. Calyx divided nearly to the base into 5 linear or oblong, obtuse lobes 3 to 4 mm. long, densely hairy and glandular like the pedicel. Corolla bright yellow, about 12 to 18 mm. across, divided almost to the base into narrowly lanceolate lobes 5 to 8 mm. long, these glabrous within but sparsely or densely pilose without from margin to margin. Stamens subsessile or filaments 0.5 mm. long, the column narrowly bottle-shaped, 5 to 7 mm. long, the combined anther sacs 1.5 to 2 mm. thick and 3.5 mm. long, the appendage tube 0.5 mm. thick and 2 or scarcely 2.5 mm. long, both decidedly mealy along the lines of fusion. Style just reaching end of tube or stigma barely exerted; ovary glandular-puberulent. Fruit sparsely pubescent with glandular or eglandular hairs or usually glabrate at maturity, spherical, 6 to 9 mm. in diameter, the calyx lobes slightly accrescent. Seeds as in *L. peruvianum*. (Pl. 8, A, and pl. 3, Q.)

Type locality: Indefatigable Island, Galápagos Islands, Cheesman in Riley 403.

GALÁPAGOS ISLANDS: Indefatigable Island, north side, November 24, 1905, *Stewart* 3376 (G, US).

4a. **Lycopersicon cheesmanii** f. **minor** (Hook. f.) C. H. Mull., comb. nov.

Lycopersicon esculentum Mill., var. *minor* Hook. f., Linn. Soc. Trans. 20: 202. 1851.

Lycopersicon peruvianum Mill., var. *parviflorum* Hook. f., l. c.

Lycopersicon peruvianum Mill., f. [2] Anderss., K. Vetensk. Akad. Handl. 1853: 216. 1855.

Differs from the type in the leaves up to 10 cm. long with the major leaflets basally divided or petiolately pinnatifid, so as to make the leaf subbipinnatifid, the more dense and longer pubescence and the strongly accrescent calyx reaching 9 to 11 mm. in length of lobes in fruit. (Pl. 8, *B* and *C*.)

Type locality: Chatham Island, Galápagos Islands.

GALÁPAGOS ISLANDS: Chatham Island, 1853, *Andersson* without number (G—probably isotype of his unnamed form No. 2); Sappho Cove, February 10, 1903, *Stewart* 3374 (G); Abingdon Island, June 1899, *Snodgrass* and *Heller* 843 (G); Albemarle Island, Villamil, November 2, 1905, *Stewart* 3372 (G); Point Christopher, January 2, 1899, *Snodgrass* and *Heller* 928 (G); Tagus Cove, January 20, 1899, *Snodgrass* and *Heller* 911 (G); James Island, August 6, 1905, *Stewart* 3378 (NY, US); June 1899, *Snodgrass* and *Heller* 399 (G, US); James Bay, August 6, 1905, *Stewart* 3348 (G); Narborough Island, April 1899, *Snodgrass* and *Heller* 305 (G).

The typical form of *L. cheesmanii* is much less common than the subspecific form. Both are clearly distinct from the other species of *Eriopersicon* in their lack of foliar pseudostipules and bracts in the inflorescence. Their relationship is obviously with *L. peruvianum* rather than with *L. hirsutum*, as is evidenced by the character of pubescence observed on the insular species.

5. **Lycopersicon hirsutum** Humb. and Bonpl. in Dun., Sol. Syn. 4. 1816. (As *Lycopersicum*.)

Lycopersicum hirsutum H. B. K., Nov. Gen. et Sp. 3: 18. 1818.

Lycopersicum agrimoniaeifolium (Pav.) Dun. in DC. Prodr. 13¹: 24. 1852.

Solanum agrimoniaeifolium Pav. ex Dun. in DC. Prodr. 13¹: 25. 1852. (As synonym.)

Annual or perennial. Stems several from the base, simple and straight, erect, finally somewhat decumbent by their own weight, rather thick (8 to 12 mm. in diameter), densely long hirsute-pilose with simple stiffish silky septate spreading persistent or caducous hairs 2.5 to 3.5 mm. long, mixed with short glandular hairs and a few appressed stellate ones, sparsely hairy in the form. Leaves 15 to 20 by 8 to 10 cm., narrowly oval in outline, interrupted pinnate, pseudostipules at the bases of the petioles similar to the leaflets, segments of three kinds, in the order of large, small, medium, small, large, etc., the large segments 3 to 6 cm. long and 1.5 to 3.5 cm. wide, short-petiolate, opposite or not, narrowly ovate to lanceolate, obtuse or subacute, basally unequally subcordate, the margins repandly many-toothed, the teeth entire or again dentate, upper surface somewhat glandular, densely hairy with a felt of short slender hairs intermixed with longer stiffish hairs or merely with scattered hairs, lower surface similar but the long hairs strongly appressed and densely concentrated on the midrib and principal veins, the medium segments 7 to 12 mm. long, subsessile, oval, subentire or shallowly toothed, small

segments 1 to 5 mm. long, sessile, oval, subentire, rachis hairy like the stem. Cymes lateral, opposite or usually 2 to 3 cm. below the nearest leaf base, dichotomous, the peduncle 5 to 10 cm. long below the furcation, the branches 3 to 8 cm. long, both hairy like the stem, each branch 10- to 12-flowered, the peduncles with a pair of bracts at the base identical with the pseudostipules of the leaves, the furcation similarly bracted, and each pedicel with a single similar bract somewhat reduced or wanting toward the apex of the inflorescence, the pedicels hairy like the peduncle, 15 to 25 mm. long, filiform (0.3 to 0.5 mm. thick) and becoming thicker after anthesis, articulated 2 to 4 mm. below the flower, frequently abruptly deflexed 90° after anthesis, the bend occurring near the flower. Calyx 5-parted nearly to the base, the lobes 8 or 9 mm. long, narrowly lanceolate, attenuately acute or finally obtuse, the outer surface glandular-long-hairy, the inner glandular-short-hairy. Corolla yellow, about 3 cm. across, saucer-shaped, 5-parted with broad acuminate-tipped lobes only 5 or 6 mm. long and 6 to 8 mm. broad, these reflexed, the undivided portion of the limb 2 cm. broad, the tube proper about 1.5 mm. long, the outer surface densely hairy in the bud, the hairs persistent as a line along the midvein of each lobe. Stamens 5, the filaments 1 mm. long, attached to the corolla at the top of the tube, the anther sacs 7 mm. long, the apical appendages 4 mm. long, attenuate, rather firmly joined into a tube, the staminal column subfusiform, 3 to 4 mm. thick, the appendage tube 1 mm. thick, the whole mealy along the lines of fusion. Style about 12 mm. long, filiform, slightly or considerably exerted from the stamen tube, stigma subclavate, not appreciably lobed. Fruit about 1.5 to 2.5 cm. in diameter, coarsely long-hirsute, greenish white with purplish longitudinal stripes, the calyx becoming 15 mm. long, the lobes 3 to 4 mm. broad, the pedicels 1 mm. thick. Seeds dark brown, glabrous save a minute line at the apex. (Pl. 9 and pl. 3, R.)

Type locality: "in agris Peruvianis prope Loxa."

PERU: "Adjoining the Inca Baths," Cajamarca, December 21, 1937, *Blood and Tremelling* 136 (USNA); east of Cajamarca, December 21, 1937, *Blood and Tremelling* 135 (USNA); west of Rio Canta, near Lima, elevation 8,000 feet, November 24, 1937, *Blood and Tremelling* 20 (USNA); along Rio Canta, near Lima, elevation 6,800 feet, November 24, 1937, *Blood and Tremelling* 21, 22, 23 (USNA); near Yoss, November 24, 1937, *Blood and Tremelling* 26 (USNA); near Huamachuco, elevation 8,500 feet, December 17, 1937, *Blood and Tremelling* 112 (USNA); "in Peruvia," Ruiz without number (type of *Solanum agrimoniae-folium* Pav., Field Museum of Natural History type photograph No. 2595) (F, G); "regno Peruviana et Chilensi," 1778-1788, Ruiz and Pavon without number (F).

ECUADOR: "Vicinity of Huigra, mostly on the Hacienda de Licay," August 18, 1918, *Rose and Rose* 22174 (G, NY); Huigra, Provincia de Chimborazo, July 4, 16, 20-27, 1923, *Hitchcock* 20337 (G, NY, US); near Guayaquil, 1932, *Mille* 976 (F); Loja, 2,000-2,300 m. (type locality), *Lehmann* 7816; Andes, 1861 *Spruce* 5169 (F).

5a. *Lycopersicon hirsutum* f. *glabratum* C. H. Mull., f. nov.

Very similar to the type and grading into it. Differs in having the stems only sparsely hirsute and somewhat glandular; leaves nearly glabrous above save for scattered appressed hairs, slightly velvety beneath, the margins ciliate; calyx lobes very slender; corolla smaller (2 cm. across), the lobes 3 or 4 mm. broad.

Formae typicae similis differt ramis sparse hirsutis, foliis supra sparse pubescentibus subtus pilosis, calycis laciniis angustissimis, corolla 2 cm. lata.

ECUADOR: "Four kilometers west of Sibambe, in canyon—elevation 5,800 feet," April 20, 1938, *Blood and Tremelling* 638 (type as sheet No. 40278, herbarium USNA); "two kilometers west of Baños, along river bank—elevation 6,000 feet," April 21, 1938, *Blood and Tremelling* 648 (USNA).

Lycopersicon hirsutum is the most outstanding species in the genus. Its erect, heavy habit and its characteristic pubescence set it off markedly from all other species. The limitation of this plant to the high altitudes of Peru and Ecuador (though it is not the only species found in those areas) suggests a physiological difference or adaptation to its habitat shared only by the next following species.

6. ***Lycopersicon glandulosum*** C. H. Mul., sp. nov.

Copiously branched, vining, elongate, perennial. Stems weak, densely pubescent with 3 types of hairs, densely felted with short 1-celled hairs, these simply or rarely capitate minutely stellate, sprinkled with short capitate resinous-glandular hairs, and markedly pilose with elongated, tapering, pointed hairs also occasionally capitate stellate, yet the stem green and not canescent. Leaves oblong to lanceolate or narrowly lanceolate in outline, 6 to 12 cm. long and 1.2 to 3.5 cm. wide, interrupted-pinnate, pseudostipulate at the bases of the petioles similar to the leaflets, the leaflets opposite or alternate, major leaflets 5 or 6 pairs, subsessile or long-petiolate, 8 to 20 mm. long and 5 to 12 mm. wide, erose-toothed or round-lobed, the minor leaflets ovate, 1 to 4 mm. long, entire or minutely erose, the rachis pubescent and glandular like the stem, the blades densely short-pubescent with 1- or 2-celled hairs but very sparsely stipitate-glandular, not at all canescent, rich green. Inflorescence of 2 racemes borne on a common peduncle 6 to 10 cm. long, or rarely simple, the racemes 5 to 8 cm. long, 6- to 10- or 12-flowered, the pedicels 10 to 18 mm. long at anthesis, articulate above the middle, the peduncles, rachises, and pedicels all basally subtended by ovate to suborbicular, simple, erose bracts 5 to 12 mm. long, or rarely one of these pinnate like the leaves, the peduncles, etc., hairy like the stems. Calyx 5-parted nearly to the base into narrowly lanceolate lobes 5 or 6 mm. long, dorsally pubescent and glandular like the pedicels but sparingly so. Corolla about 20 mm. across, divided halfway to the base into broadly triangular reflexed lobes with narrow apices, dorsally sparingly hairy along the median line. Staminal column 7 to 10 mm. long, bottle-shaped, strongly bent to one side, the anthers subsessile, the combined anther sacs scarcely 2 to nearly 3 mm. in thickness and 5 to 7 mm. long, the appendage tube markedly curved downward, about 2 to 3 mm. long. Style exerted about 1.5 to 2 mm. from the tube, the stigma bulbously capitate, the ovary finely hairy especially about the apex. Fruit on usually markedly accrescent pedicels up to 25 mm. in length, somewhat enclosed by similarly accrescent linear-lanceolate calyx lobes about 12 to 15 by 1.5 mm., the berry globose, about 10 or 12 mm. in diameter, whitish with lavender stripes rather diffuse but evident about the apex, when young quite densely pilose about apex, shorter pubescent below. Seeds as in *L. peruvianum*. (Pl. 10 and pl. 3, S.)

Glanduloso-puberulum et pilosum nunquam canescens; folia oblonga vel anguste lanceolata, 6–12 cm. longa, interrupte pinnatisecta, foliolis majoribus 10–12, petiolatis vel subsessilibus 8–20 mm. longis 5–12 mm. latis erosis vel rotundo-lobatis, minoribus ovatis 1–4

mm. longis integris vel erosis; inflorescentia bifido-cymosa bracteosa; floreis *L. peruviani* similes; bacca globosa 10–12 mm. crassa pubescens et apice pilosa.

PERU: Between Yangos and Cantas, Cantas Valley, near Lima, altitude 5,600 to 8,500 feet, November 24, 1937, *Blood* and *Tremelling* 14, 15 (type as sheet No. 40377, herbarium USNA), 16, 17, 18, 19 (USNA); "on Rio near Lima," November 24, 1937, *Blood* and *Tremelling* 24 (USNA); vicinity of Matucana, near Lima, altitude 3,500 to 7,300 feet, November 26, 1937, *Blood* and *Tremelling* 29, 30, 31 (USNA); west of San Mateo, near Lima, altitude 9,500 feet, December 8, 1937, *Blood* and *Tremelling* 75 (USNA); near Lima, December 8, 1937, *Blood* and *Tremelling* 78 (USNA); Santa Eulalia, above Chosica, Departamento de Lima, October 10, 1935, *West* 3600 (G); road from Chosica to Matucana, Departamento de Lima, October 20, 1935, *Meria* 4077 (G).

Lycopersicon glandulosum is a very stable species and exhibits very little variability even under different cultural conditions, a characteristic clearly to be expected in an endemic species. It is more closely related to *L. hirsutum* than to any other species of the subgenus *Eriopersicon*, but its slender vining stems, smaller and more dissected leaflets, and many other differences readily obscure this relationship and serve to distinguish the species. From all other species of the subgenus it is readily set off by its copiously spreading-hairy stems, leaf rachises, peduncles, and pedicels, its rich green vegetative parts not at all canescent, and by having the ovary and young fruit densely long-hairy about the apex. Its erose or lobed leaflets would confuse this species with *L. peruvianum* var. *dentatum* were it not for the nature of the pubescence.

Several plantings of this species at Glenn Dale, Md., grew luxuriantly and flowered profusely all summer but never set any fruit. Related species, on the other hand, fruited readily. Only *L. hirsutum* showed similar difficulty in setting fruit. It is significant that both *L. glandulosum* and *L. hirsutum* are obligate inhabitants of high altitudes, occurring usually above 7,000 feet and only rarely as low as 3,500 feet.

The striking pubescence characters of *L. hirsutum* and *L. glandulosum* suggest a natural group equal in rank to the subgenus *Eulycopersicon* and distinct from *Eriopersicon*. Should future explorations greatly add to the number of species in this group, it might prove convenient to separate it as a section of the subgenus.

DOUBTFUL SPECIES

Lycopersicum diadelphum Dun. in DC. Prodr. 13¹: 27. 1852.= probably *Lycopersicon esculentum*.

EXCLUDED SPECIES

Lycopersicon aethiopicum Mill., Gard. Diet. ed. 8. 1768. *Lycopersicon* No. 3.=*Solanum aethiopicum*.

Lycopersicon procumbens Mill., Gard. Diet. ed. 8. 1768. *Lycopersicon* No. 6.=?*Solanum* sp.

Lycopersicon tuberosum Mill., Gard. Diet. ed. 8. 1768. *Lycopersicon* No. 7.=*Solanum tuberosum*.

Lycopersicon dulcamara Medic., Bot. Boeb. 1783: 247. 1784.=*Solanum dulcamara*.

Solanum pyriforme Poir. ex Lam., Encyc. 4: 291. 1797.= erroneous citation in Index Kewensis of *S. pyriforme* and erroneously referred to *Lycopersicum pyriforme* Dun. as a synonym.

LIST OF EXSICCATAE¹⁵

- ALFARO, A.
32417. *Lycopersicon esculentum* var. *cerasiforme*.
- ANDERSSON, N. J.
(1853.) *L. cheesmanii* f. *minor*.
- ARSÈNE, G.
10585. *L. esculentum*.
- BAENITZ, C.
(September 20, 1893.) *L. esculentum*.
- BAILEY, L. H.
12553, (September 6, 1886). *L. esculentum* var. *cerasiforme*.
(October 1, 1886) (December 3, 1887). *L. pimpinellifolium*.
(September 27, 1891.) *L. esculentum* f. *pyriforme*.
(July 3, 1919), (July 22, 1919), (August 18, 1919). *L. pimpinellifolium*.
(October 1, 1929.) *L. esculentum* var. *cerasiforme*.
(July 23, 1938.) *L. peruvianum*.
- BAILEY, L. H., and BAILEY, E. Z.
288. *L. esculentum* f. *pyriforme*.
843. *L. esculentum* var. *cerasiforme*.
1246. *L. esculentum*.
6493. *L. esculentum* var. *cerasiforme*.
- BALDWIN.
— *L. pimpinellifolium*.
- BAUR, G.
188, 189. *L. pimpinellifolium*.
- BECKWITH, F.
779. *L. esculentum* var. *cerasiforme*.
- BERLANDIER, J. I.
22, 975, 2405. *L. esculentum* var. *cerasiforme*.
- BLAKE, S. F.
7286, 7384. *L. esculentum* var. *cerasiforme*.
- BLANCHET.
— *L. esculentum* var. *cerasiforme*.
- BLOOD, H. L., and TREMELLING, L.
5. *L. peruvianum*.
6–10. *L. pimpinellifolium*.
14–19. *L. glandulosum*.
20–23. *L. hirsutum*.
24. *L. glandulosum*.
26. *L. hirsutum*.
29–31. *L. glandulosum*.
43. *L. esculentum*.
45. *L. esculentum* f. *pyriforme*.
49, 50, 52, 53. *L. esculentum* var. *cerasiforme*.
54. *L. peruvianum* var. *dentatum*.
62, 68, 70. *L. esculentum* var. *cerasiforme*.
75. *L. glandulosum*.
76. *L. pimpinellifolium*.
77. *L. peruvianum* var. *dentatum*.
78. *L. glandulosum*.
82. *L. pimpinellifolium*.
- BLOOD, H. L., and TREMELLING, L.—
Continued.
83. *L. peruvianum*.
84. *L. pimpinellifolium*.
85, 86, 88. *L. peruvianum*.
93–95, 97. *L. pimpinellifolium*.
98–100. *L. peruvianum*.
102, 103, 105–108. *L. pimpinellifolium*.
111. *L. peruvianum* var. *dentatum*.
112. *L. hirsutum*.
114, 115. *L. pimpinellifolium*.
120. *L. esculentum* var. *cerasiforme*.
123, 124, 127, 128. *L. pimpinellifolium*.
135, 136. *L. hirsutum*.
141, 142. *L. peruvianum* var. *humifusum*.
149. *L. esculentum* f. *pyriforme*.
161. *L. peruvianum* var. *dentatum*.
162. *L. peruvianum*.
168, 169. *L. peruvianum* var. *dentatum*.
178. *L. esculentum* var. *cerasiforme*.
179–182. *L. pimpinellifolium*.
184. *L. peruvianum* var. *humifusum*.
202. *L. esculentum* var. *cerasiforme*.
228, 239, 303, 354. *L. esculentum*.
448. *L. esculentum* var. *cerasiforme*.
475–478. *L. peruvianum* var. *dentatum*.
479. *L. peruvianum*.
480–482. *L. peruvianum* var. *dentatum*.
483. *L. peruvianum*.
485. *L. peruvianum* var. *dentatum*.
486. *L. peruvianum*.
487, 508–510, 512–516, 537–539. *L. peruvianum* var. *dentatum*.
540. *L. peruvianum*.
561, 563. *L. pimpinellifolium*.
564, 579. *L. esculentum* var. *cerasiforme*.
580, 581. *L. peruvianum* var. *dentatum*.
584, 587, 591, 593, 604. *L. esculentum* var. *cerasiforme*.
638, 648. *L. hirsutum* f. *glabratum*.
671. *L. esculentum* var. *cerasiforme*.
734. *L. esculentum*.
735. *L. esculentum* var. *cerasiforme*.
- BLUMER, J. C.
2266. *L. esculentum*.
- BOEEA, RAHMAT SI.
8535. *L. esculentum* var. *cerasiforme*.
- BRITTON, N. L.
3307. *L. esculentum* var. *cerasiforme*.
(October 1889.) *L. esculentum*.
- BRITTON, N. L., and BRITTON, E. G.
9040. *L. esculentum* var. *cerasiforme*.

¹⁵ Numbers cited are collectors' numbers; figures in parentheses are dates of collection, given only when no collection number was available.

- BRITTON, N. L., BRITTON, E. G., and SHAFER, J. A.
364. *L. esculentum* var. *cerasiforme*.
- BRITTON, N. L., HAZEN, T. E., and MENDELSON, W.
1089. *L. esculentum* var. *cerasiforme*.
- BUCHTIEN, OTTO.
116, 225, 1455, (1891), (1895). *L. esculentum*.
(1914.) *L. peruvianum*.
- BUENSUCESO, H.
(October–December 1925.) *L. esculentum* var. *cerasiforme*.
- BUYSMAN, M.
(August 31, 1897.) *L. esculentum*.
- CALDERÓN, S.
749. *L. esculentum* var. *cerasiforme*.
- CANBY, W. J.
(1881.) *L. esculentum*.
- CARLETON, M. A.
484. *L. esculentum* var. *cerasiforme*.
- CHESNUT, V. K.
362. *L. esculentum*.
- CLEMENS, J., and CLEMENS, M. S.
3759. *L. esculentum*.
- COCKERELL, T. D. A.
(August 17, 1925.) *L. peruvianum* var. *dentatum*.
- COMBS, R.
225. *L. esculentum* var. *cerasiforme*.
- COOK, A. C.
324, 748. *L. esculentum*.
- COOK, O. F., and GILBERT, G. B.
1405. *L. pimpinellifolium*.
1603. *L. esculentum*.
1702. *L. pimpinellifolium*.
- DROUET, F.
2396, 2472. *L. esculentum* var. *cerasiforme*.
- DUSS, P.
2091, 2879, 3785. *L. esculentum*.
- EKMAN, E. L.
5535. *L. esculentum* var. *cerasiforme*.
- EMERY, E. R.
(February 15, 1900.) *L. esculentum*.
- FERRIS, R. S., and DUNCAN, C. D.
3184. *L. esculentum* var. *cerasiforme*.
- FREDHOLM, A.
5842. *L. esculentum* var. *cerasiforme*.
- GAUDICHAUD.
23075, (1841), ———. *L. peruvianum* var. *dentatum*.
- GAUMER, G. F.
1230. *L. esculentum* var. *cerasiforme*.
2272. *L. esculentum*.
23882, 23913. *L. esculentum* var. *cerasiforme*.
- GAY, CL.
(October 1839–February 1840.) *L. esculentum*.
- GAY, J.
(October 1815.) *L. esculentum* var. *cerasiforme*.
- GENTRY, H. S.
1266. *L. esculentum* var. *cerasiforme*.
- GOODWIN, WM.
———. *L. pimpinellifolium*.
- GRAY, R. T.
80999. *L. pimpinellifolium*.
- GÜNTHER, E.
12306. *L. peruvianum* var. *dentatum*.
- HANSON, H. C.
459. *L. esculentum* var. *cerasiforme*.
- HARRIS, Wm.
11896. *L. esculentum* var. *cerasiforme*.
- HARRISON, C.
(September 23, 1897), (October 7, 1897). *L. esculentum*.
- HATRY, O.
(August 23, 1903.) *L. esculentum*.
- HAUGHT, O.
2. *L. esculentum* var. *cerasiforme*.
- HEILAND.
(August 1882.) *L. esculentum*.
- HELLER, A. A.
1998. *L. esculentum* var. *cerasiforme*.
- HERIBAUD, F.
(August 10, 1910), (August 14, 1910). *L. esculentum*.
- HEYDE and LUX.
6360. *L. esculentum* var. *cerasiforme*.
- HITCHCOCK, A. S.
13837. *L. esculentum* var. *cerasiforme*.
20119. *L. pimpinellifolium*.
20337. *L. hirsutum*.
- HOLMES, O. F.
791. *L. peruvianum* var. *dentatum*.
- HORNER, C. N. S.
———. *L. esculentum*.
- JAFFNEL, F.
25. *L. peruvianum* var. *humifusum*.
1045, 1059. *L. peruvianum* var. *dentatum*.
1647, 1715. *L. peruvianum*.
- JOHNSTON, I. M.
3557. *L. peruvianum*.
3606, 5589, 5607. *L. peruvianum* var. *dentatum*.
- KELLER, J. H.
(August 23, 1906.) *L. pimpinellifolium*.
- KELLERMAN, W. A.
5706, 7694. *L. esculentum* var. *cerasiforme*.
- KELLOGG, J. H.
(May 9, 1911.) *L. pimpinellifolium*.
- KENNEDY, G. G.
(September 3, 1912.) *L. esculentum*.

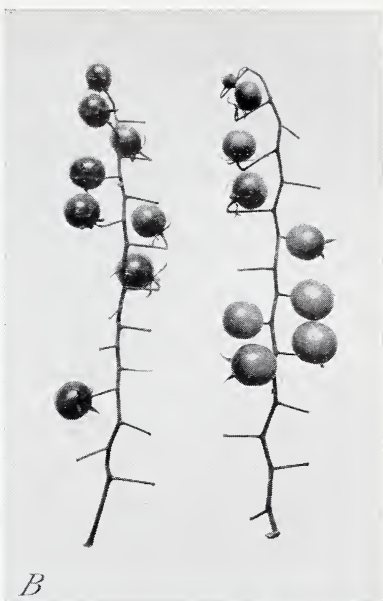
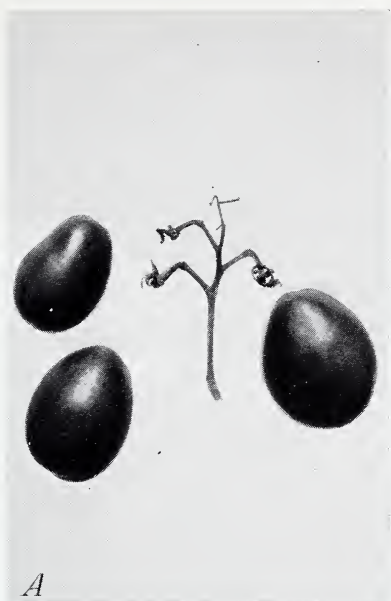
- KILLIP, E. P., and SMITH, A. C.
27496. *L. esculentum*.
- LEHMANN.
7816. *L. hirsutum*.
- LEONARD, E. C.
8479, 9385. *L. esculentum* var.
cerasiforme.
- LEVINE, C. O.
1055. *L. esculentum*.
1888. *L. esculentum* var. *cerasi-*
forme.
- LOHMEYER.
(July 6, 1896.) *L. esculentum*.
- MALTBY, F. S.
115. *L. esculentum* var. *cerasiforme*.
- MANGUBAT, L.
386. *L. esculentum* var. *cerasiforme*.
- MCCARTHY, G.
(August 5, 1885.) *L. esculentum*.
- MC ELWEE, A.
(August 1889.) *L. esculentum*.
- MCGREGOR, R. C.
20139. *L. esculentum* var. *cerasi-*
forme.
- MCKAY, J.
(October 23, 1930.) *L. pimpinell-*
lifolium.
- MEEHAN, T.
———. *L. pimpinellifolium*.
- MERRILL, E. D.
14. *L. esculentum* var. *cerasiforme*.
- MEXIA, Y.
4077. *L. glandulosum*.
- MILLE, L.
976. *L. hirsutum*.
- MILLSPAUGH, C. F.
141. *L. esculentum* var. *cerasiforme*.
- MOORE, A. H.
2160, 2446, 3168. *L. esculentum*.
- MOLDENKE, H. N.
2069, 8589. *L. esculentum*.
- NELSON, GEO.
48. *L. esculentum* var. *cerasiforme*.
- NELSON, J. C.
3317, 4900. *L. esculentum*.
- NELSON, N. L. T.
(September 1898), (August 1899).
L. esculentum.
- PACKARD and HARRISON.
(September 21, 1899.) *L. escu-*
lentum.
- PENNELL, F. W.
13147. *L. peruvianum* var. *denta-*
tum.
- POITEAU.
———. *L. esculentum*.
- RAMOS, M.
5211. *L. esculentum* var. *cerasi-*
forme.
- REDFIELD, J. H.
(August 2, 1877.) *L. esculentum*.
- REGNELL, A. F.
993. *L. esculentum*.
- REKO, B. P.
4032. *L. esculentum* var. *cerasi-*
forme.
- RIVAS, E. G.
19. *L. esculentum*.
- ROSE, J. N., and ROSE, GEO.
22174. *L. hirsutum*.
- ROSE, J. N., and ROSE, MRS. J. N.
18589. *L. peruvianum*.
- ROSE, J. N., and RUSSELL, P. G.
24288. *L. esculentum* var. *cerasi-*
forme.
- ROSE, J. N., STANDLEY, P. C., and RUS-
SELL, P. G.
13360, 13390, 13465, 13647, 14962.
L. esculentum var. *cerasiforme*.
- RUIZ and PAVON.
(1778-1788.) *L. peruvianum*.
(1778-1788.) *L. hirsutum*.
- RUIZ, HERB. of.
———. *L. hirsutum*.
- RYDBERG, P. A.
(August 25, 1908.) *L. esculentum*.
- SAFFORD, W. E.
(August 29, 1887.) *L. peruvianum*.
- SCHIMPF, H. J. F.
12. *L. pimpinellifolium*.
- SCHWEINETZ and BALDWIN.
———. *L. esculentum*.
- SHAFFER, J. A.
1819, 2916. *L. esculentum* var.
cerasiforme.
- SHARPLES, S. P.
(June, 1858-1864.) *L. esculentum*.
- SHEPARD, R. S.
281. *L. peruvianum* var. *dentatum*.
- SKOTTSBERG, C.
1072. *L. peruvianum*.
- SMALL, J. K.
2191, 2198, 3876. *L. esculentum*.
8256. *L. esculentum* var. *cerasi-*
forme.
(August 4, 1892), (July 4, 1893).
L. esculentum.
- SMALL, J. K., and CARTER, J. J.
87, 2914. *L. esculentum* var. *cerasi-*
forme.
- SMALL, J. K., and SMALL, E. W.
5414. *L. esculentum*.
- SMALL, J. K., and SMALL, G. K.
4952. *L. esculentum*.
- SMALL, J. K., and WHERRY, E. T.
11788. *L. esculentum* var. *cerasi-*
forme.
- SMITH, B. H.
991. *L. esculentum* var. *cerasiforme*.
- SMITH, C. L.
1073. *L. esculentum* var. *cerasi-*
forme.
- SMITH, H. H., and SMITH, G. W.
982. *L. esculentum*.
- SNODGRASS, R. E., and HELLER, E.
305, 399. *L. cheesmanii* f. *minor*.
526, 741. *L. pimpinellifolium*.
843, 911, 928. *L. cheesmanii* f.
minor.
- SPRUCE, R.
4143. *L. esculentum* var. *cerasi-*
forme.
5169. *L. hirsutum*.

- STANDLEY, P. C.
 19621, 21093, 22549, 24672. *L. esculentum* var. *cerasiforme*.
 26369. *L. esculentum*.
 34768. *L. esculentum* var. *cerasiforme*.
 53699. *L. esculentum*.
- STEVENSON, J. A.
 3954, 5445. *L. esculentum* var. *cerasiforme*.
- STEWART, A.
 3348, 3372, 3374. *L. cheesmanii* f. *minor*.
 3375. *L. pimpinellifolium*.
 3376. *L. cheesmanii*.
 3378. *L. cheesmanii* f. *minor*.
 3379, 3380. *L. pimpinellifolium*.
- SVENSON, H. K.
 281. *L. pimpinellifolium*.
- THOMPSON, J. B.
 181, 1098. *L. esculentum*.
- TONDUZ, A.
 10403. *L. esculentum* var. *cerasiforme*.
- TOPPING, D. L.
 8. *L. esculentum* var. *cerasiforme*.
- TOWNSEND, C. H. T.
 1395. *L. pimpinellifolium*.
- UMBACH, L. M.
 (August 26, 1898.) *L. esculentum*.
- URBAN, I.
 784. *L. esculentum* var. *cerasiforme*.
- VARGAS C., C.
 (May 1938.) *L. esculentum*.
- WARD, L. F.
 ———. *L. esculentum*.
- WEBERBAUER, A.
 5736, 7445, 7449. *L. peruvianum* var. *dentatum*.
- WERDERMANN, E.
 706. *L. peruvianum* var. *dentatum*.
- WEST, J.
 3600. *L. glandulosum*.
- WILKES EXPEDITION.
 (1838-1842.) *L. pimpinellifolium*.
 ———. *L. peruvianum*.
- WILLIAMS, E. F.
 (August 22, 1897), (September 12, 1908), (August 3, 1910). *L. esculentum*.
 (September 19, 1910.) *L. esculentum* var. *cerasiforme*.
- WILLIAMS, L.
 9080. *L. esculentum* var. *cerasiforme*.
- WILLIAMSON, C. S.
 (August 1894.) *L. esculentum*.

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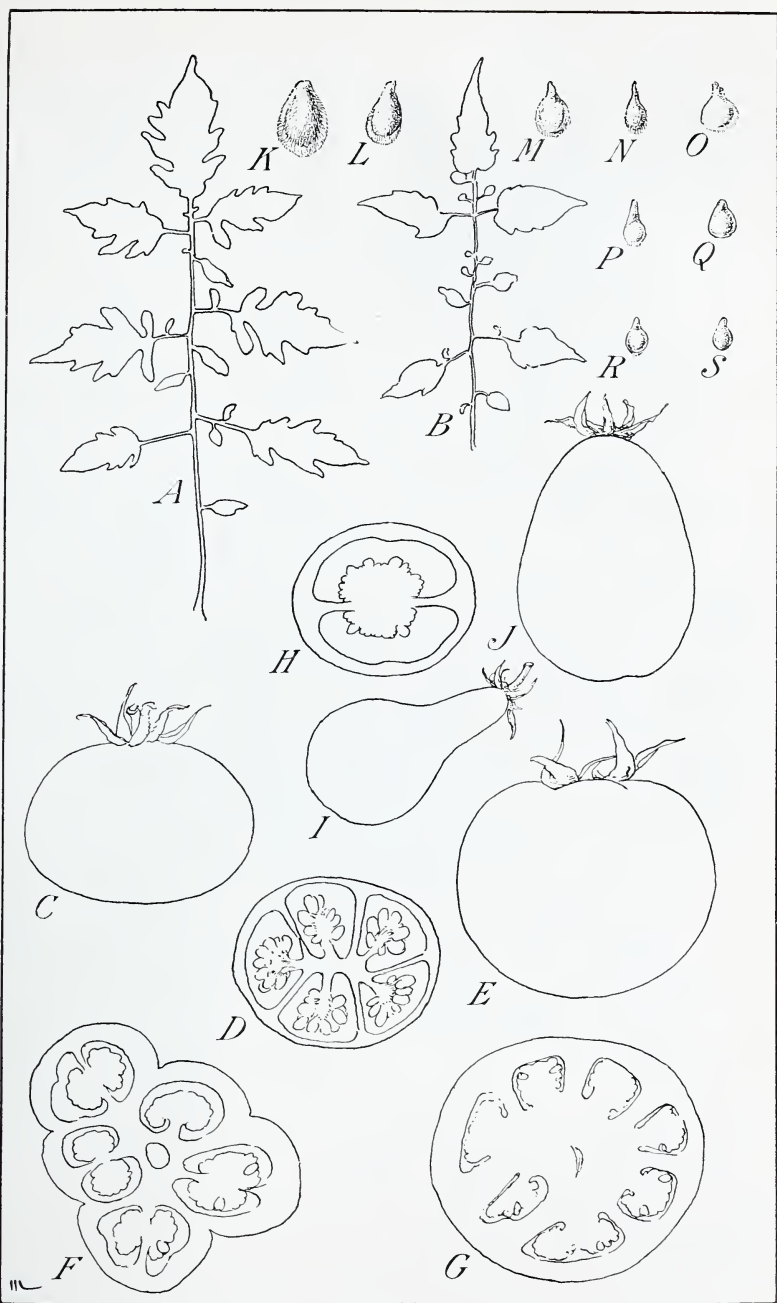
¹⁶New names and new combinations published for the first time in this publication appear in bold-faced type, synonyms in italics, accepted names in roman; page numbers in boldface indicate the place of principal treatment.



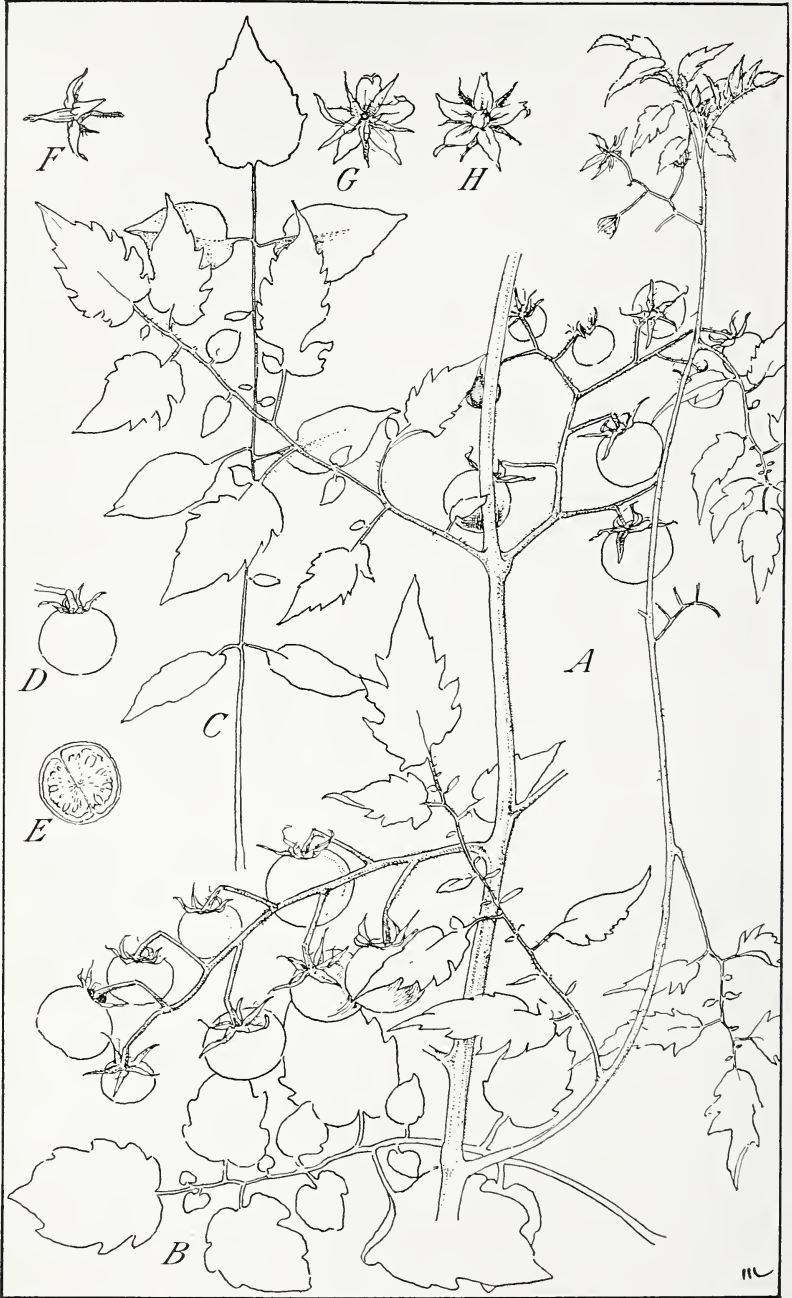
Fruiting habits of *Lycopersicon*. A, A fruiting peduncle of *L. esculentum* f. *pyriforme*, $\times \frac{1}{2}$. B, Two typically simple racemose peduncles of *L. pimpinellifolium*, $\times \frac{1}{2}$. C, Extraordinary growth of a *L. pimpinellifolium* peduncle, $\times \frac{1}{12}$, caused by temperature and humidity conditions in a greenhouse. Note the production of foliar bracts and the frequent branching. D, Two typically furcate peduncles of *L. peruvianum*, $\times \frac{1}{2}$. Note the foliar bracts at the bases of some of the pedicels and peduncles and the white stripes on the hairy green fruits. The lavender apical streaks are not visible.



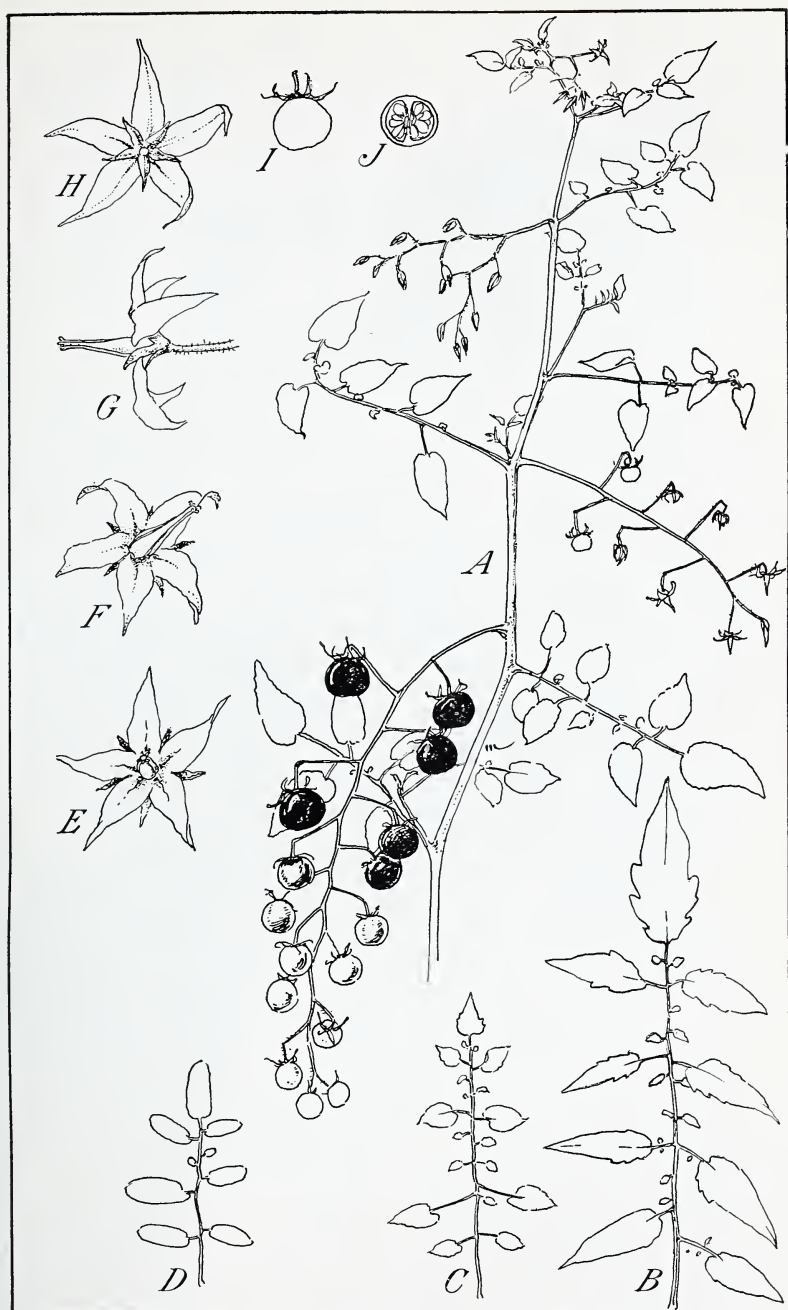
Lycopersicon esculentum: A, Habit, $\times \frac{1}{2}$; B, C, leaf variations, $\times \frac{1}{2}$; D to F, flowers, $\times 1$ (note the number of perianth segments in the flowers).



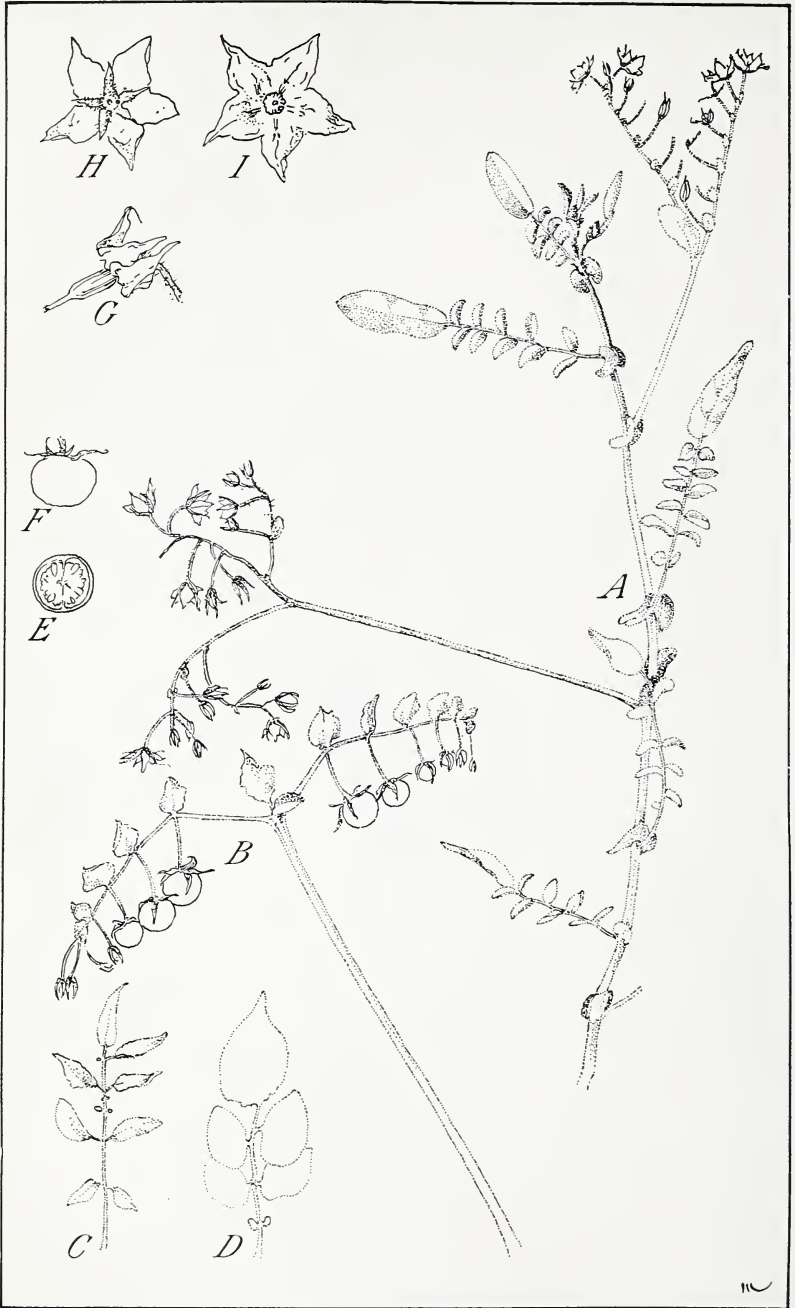
A to G, *Lycopersicon esculentum*: A, B, Leaf variations, $\times \frac{1}{2}$; C to G, fruit types, $\times \frac{1}{2}$; H to J, fruit of *L. esculentum* f. *pyriforme*, $\times 1$; K to S, seeds, $\times 2\frac{1}{2}$; K, *L. esculentum*; L, *L. esculentum* var. *cerasiforme*; M, *L. pimpinellifolium*; N, *L. peruvianum*; O, *L. peruvianum* var. *dentatum*; P, *L. peruvianum* var. *humifusum*; Q, *L. cheesmanii*; R, *L. hirsutum*; S, *L. glandulosum*.



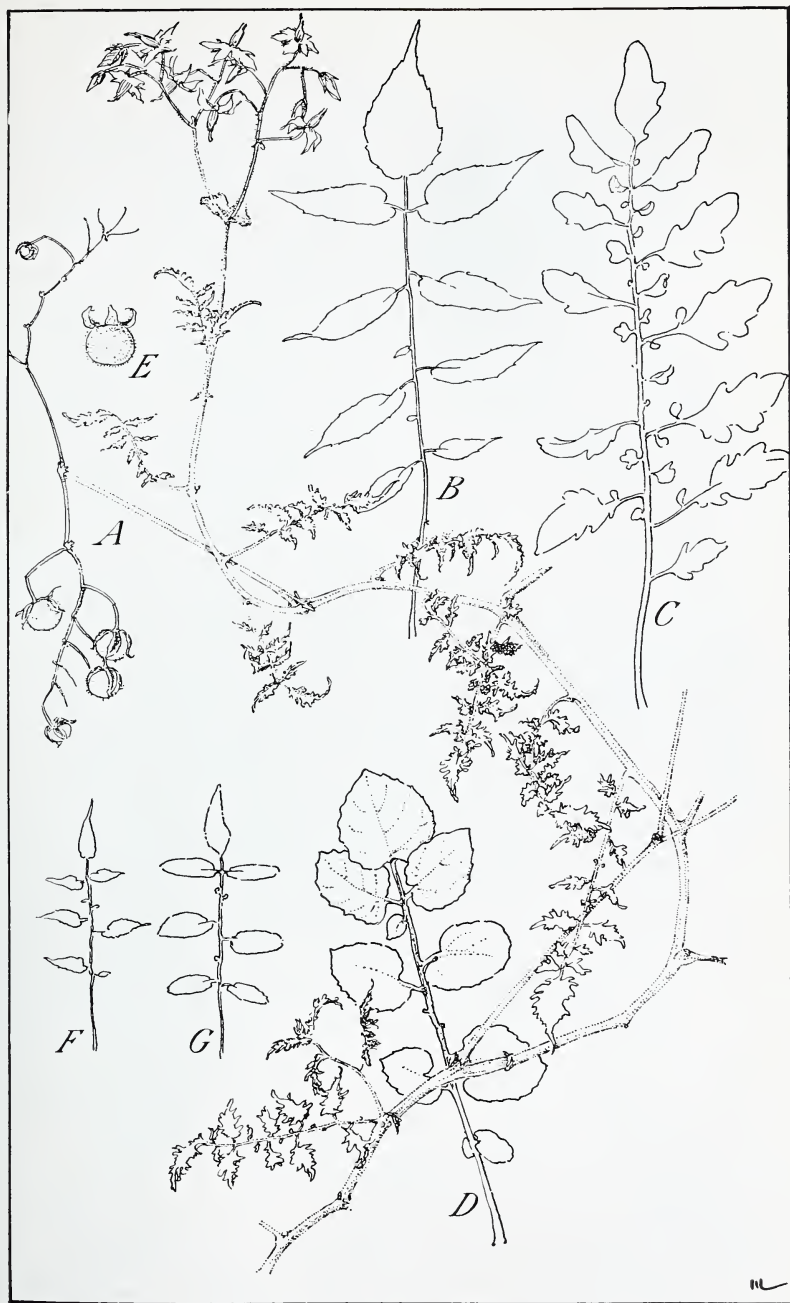
Lycopersicon esculentum var. *cerasiforme*: A, Habit, $\times \frac{1}{2}$; B, C, leaf variations, $\times \frac{1}{2}$; D, E, fruit, $\times \frac{1}{2}$; F to H, flowers, $\times \frac{1}{2}$.



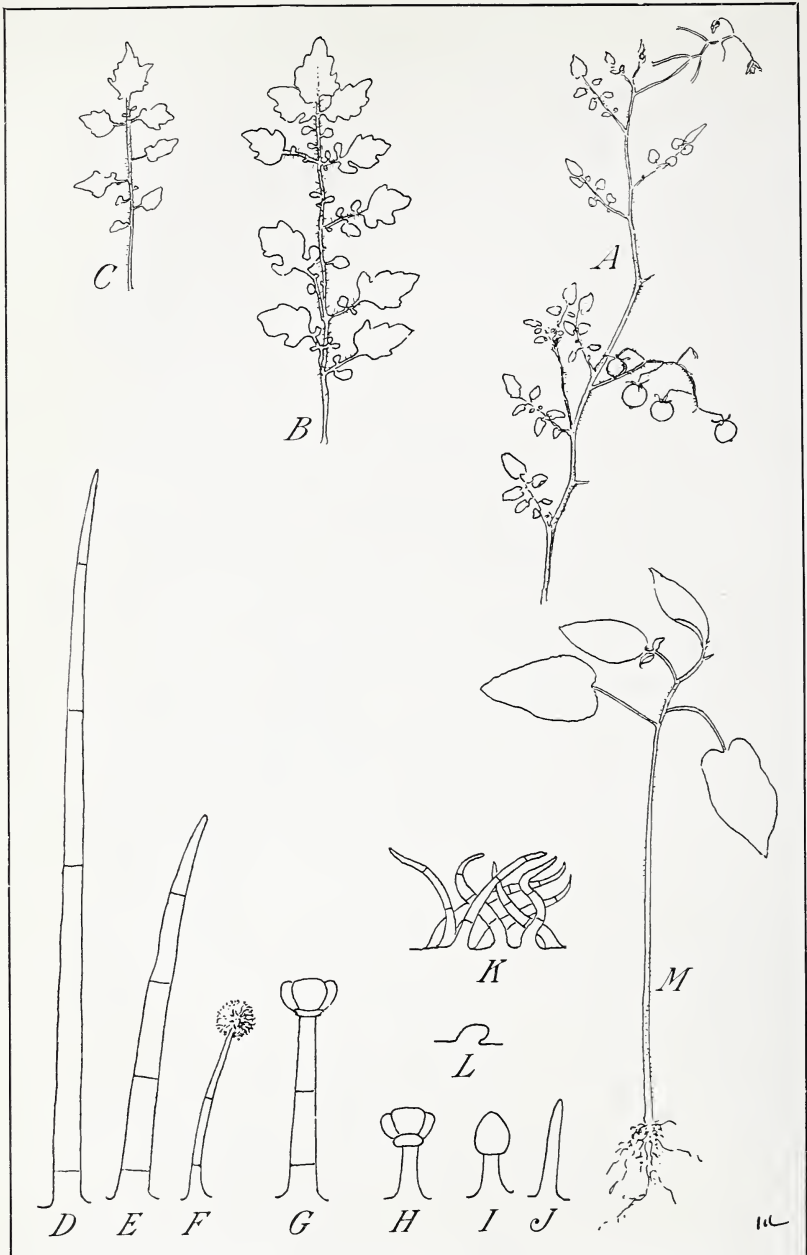
Lycopersicon pimpinellifolium: A, Habit, $\times \frac{1}{2}$; B to D, leaf variations, $\times \frac{1}{2}$; E to H, flowers, $\times 2$; I, J, fruit, $\times 1$.



Lycopersicon peruvianum: A, Habit, $\times \frac{1}{2}$; B, fruiting peduncle, $\times \frac{1}{2}$. (note the prominent bracts; C, D, leaf variations, $\times \frac{1}{2}$; E, F, fruit, $\times \frac{1}{2}$; G to I, flowers, $\times 1$.)



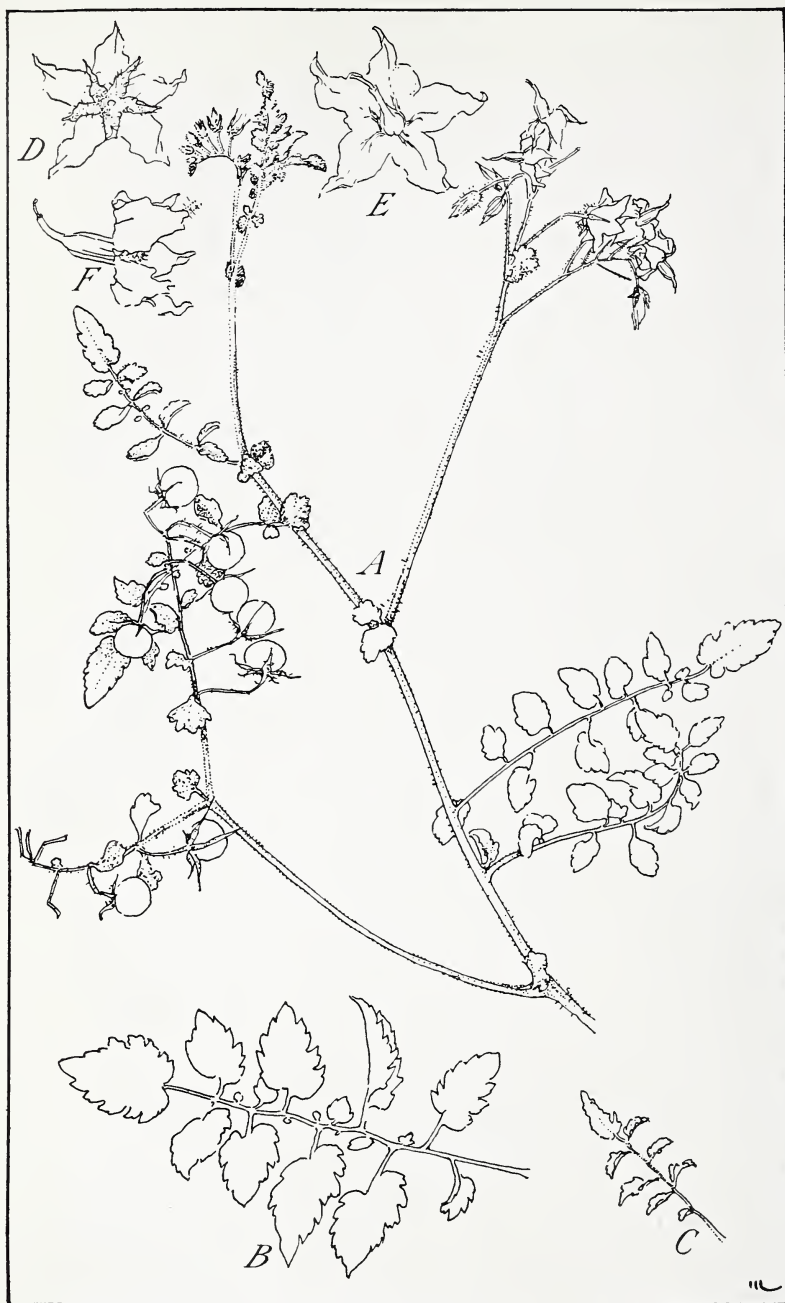
A to E, *Lycopersicon peruvianum* var. *dentatum*, $\times \frac{1}{2}$: A, Habit; B to D, extreme leaf variations (some become much like typical *L. peruvianum*); E, fruit; F, G, leaves of *L. peruvianum* var. *humifusum*, $\times \frac{1}{2}$.



A, *Lycopersicon cheesmanii* habit, $\times \frac{1}{2}$. B, C, Leaves of *L. cheesmanii* f. *minor*, $\times \frac{1}{2}$. D to K, Hairs from various species of *Lycopersicon*, $\times 50$; D, an elongate septate hair of *L. hirsutum*; E, a similar hair from *L. glandulosum*; F, a capitate stellate cluster; G to I, capitate glands on septate and simple hairs, as they appear on both *L. glandulosum* and *L. cheesmanii*; J, a simple unicellular hair on *L. cheesmanii*; K, matted short hairs on *L. peruvianum*; L, an epidermal excrecence, $\times 250$, of the type that produces the granular appearance of most species; M, a seedling of *L. esculentum* bearing the first four true leaves. Note that the first two are simple whereas the third one bears two definite lateral leaflets.



Lycopersicon hirsutum: A, Habit, $\times \frac{1}{2}$; B, the less pubescent leaf form, $\times \frac{1}{2}$;
C to E, flowers, $\times 1$; F, G, fruits, $\times 1$.



Lycopersicon glandulosum: A, Habit, $\times \frac{1}{2}$; B, C, leaf variations, $\times \frac{1}{2}$; D to F, flowers, $\times 1$.

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