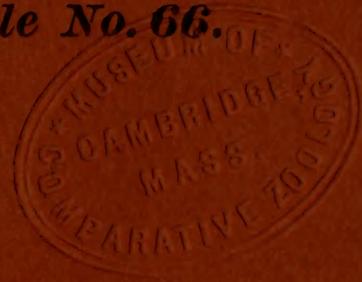


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THE WEST AMERICAN SCIENTIST

VOLUME VIII.

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SOME LARVÆ ON SCRUB OAK.

BY C. H. TYLER TOWNSEND.

The following five species of lepidopterous larvæ were either taken directly from, or believed to have come from, the scrub oak which grows in the Organ mountains, in southern New Mexico. This scrub oak has been determined for me by Mr. Walter H. Evans as *quercus undulata* var. *wrightii*.

(Figures in parentheses refer to numbers of alcoholic specimens in New Mexico College collection).

(a) A LIGHT GREEN GEOMETRID LARVA OR SPAN-WORM. Two pairs of prolegs, one on anal (13th) segment, and the other evidently on hindmost edge of segment 10, but appearing to be on 11. Body elongate and narrow, subcylindrical. Head and prothoracic segment slightly chitinous, rest of segments somewhat leathery. Whole larva nearly same width, but a little narrowed anteriorly on abdominal segments. Head rather rounded in outline, mottled with pale brownish in three areas on posterior half, about same width as prothoracic segment. Thoracic segments very short, about one-third as long as wide, the posterior two somewhat wider than the prothoracic. Segments 5 to 9 much elongate, about twice as long as wide; 10 but little longer than wide; 11 and 12 about half as long as wide; anal (13) slightly longer, with a dorsal shield rapidly narrowed and rounded behind, two anal tubercular projections immediately beneath tip of latter, and the anal prolegs springing from beneath sides of shield-like dorsum. Head and thoracic segments with a few hairs; the elongate abdominal segments with about four dorsal and four ventral very short and inconspicuous hairs. All the segments, except prothoracic, head and anal, more or less

transversely wrinkled and somewhat irregularly but quite thickly covered both dorsally and ventrally with minute wart-like concolorous tubercles, which give the integument a papillate and roughened appearance. Length, 16 mm.

One specimen beaten from foliage, May 24, 1891. In a north side branch of Soledad canyon. Color noted in life. [No. 127].

(b) A MODERATELY LARGE, STOUT, BROWNISH LARVA, MIMICKING SOMEWHAT A SPAN-WORM. Five pairs of prolegs, on segments 7 to 10, and 13, but anterior pair much smaller, shorter and less developed than others. Body humped between true legs and prolegs. Head a little narrower than anterior segments, rounded in outline, the head and median portion of prothoracic segment somewhat chitinous, rest fleshy. Prothoracic segment a little narrower than other two thoracic segments. Segment 5 a little constricted, also 6 anteriorly; 7 to 11 wider, about equal in width; 12 and 13 successively narrowing. Three thoracic segments short, hardly one-third as long as wide; 5 and 6 not quite as long as wide; 7 to 10 not or hardly one-half as long as wide; 11 and 12 about one-half as long as wide; 13 elongate, with a transverse suture or wrinkle making it appear as two segments. Head paler, irregularly brown reticulate, the anterior portion before margin broadly blackish; a short longitudinal brownish stripe on each side on posterior part of head, each with some lateral lines running outward and directed slightly forward, but this pattern is not distinct in all specimens. Head deeply once notched behind. Body with two median dorsal longitudinal heavy brown stripes continued upon anterior portion of anal segment, less distinctly separated on segments 5 and 6, and emarginate on inner edge on 8 to 12. A longitudinal lateral brownish stripe also on each side near edge of dorsum, rest of dorsal portion and venter light colored. Head with some hairs, especially anteriorly and below; dorsum and venter with a few hairs on each segment. Six well developed thoracic legs, with a number of hairs on each. Length, 16 to 23 mm.

Nine specimens, May 23, 1891. Found in a north side branch of Soledad canyon, under rather loose bark of a fallen dead scrub oak. They seemed to be the same as the larvæ which were constantly dropping from scrub oaks in this spot all that day and night, though I have none of the latter for comparison,

since when I beat the branches for them the next morning they had all gone and none could be found. It is quite probable that they drop from the foliage, and crawl into such shelter as they can find for pupation. [No. 126].

(c) A SIMILAR, BUT SMALLER, MORE NARROWED AND ELONGATED SPECIES THAN THE PRECEDING. Five usual pairs of prolegs, on segments 7 to 10, and 13. Two forms occur, which may be the same species or not. They are both pale colored, with more or less of a yellowish tinge, with a median longitudinal brown stripe from anterior margin of mesothoracic segment to posterior portion of twelfth segment. Head, dorsal shield of prothoracic segment, and six thoracic legs subchitinous and yellowish with pale brownish and black specks and markings. Head notched behind, the anterior margin of prothoracic segment fitting into the notch. Whole larva sparsely hairy, including head, thoracic segments and venter; hairs arising from blackish dots. Head and all the segments of nearly the same width, the last two segments gradually and successively slightly narrowed. Segments nearly the same length. Dorsum of mesothoracic to anal segments with three closely approximated and well defined longitudinal brownish lines on each side of the median brown stripe. Antennæ are rather elongate and prominent, 3-jointed; basal joint longest and stoutest, subconical, yellow; the second joint brown, small; third joint very small, pale brownish. Spinneret drawn out into an elongated point. One darker specimen shows the usual pale brown markings on posterior portion of head black.

The other form differs principally in having only two of the lateral lines, instead of three, on each side of median stripe, though there are apparent gradations between. The body is somewhat stouter also. The head and prothoracic dorsum are less speckled and marked. Length, 10 to 16 mm.

Four specimens of the first form (including the longest and shortest of above measurements), two of the second form, and three of gradations between. May 23, 1891. Found under the scrub oak bark with the preceding larger species. [No. 231].

(d) AN ORANGE-YELLOW AND GRAYISH, ALMOST ENTIRELY NAKED CATERPILLAR. Five pairs of prolegs, on usual segments. Three pairs of well developed thoracic legs, chitinous, orange-

yellow. Head somewhat narrower than body, anterior edge rather truncate, rest rounded, whole surface entirely orange-yellow, chitinous, rest of body rather fleshy. Segments nearly same width, two anterior thoracic segments a little narrowed; 12 and 13 narrowed, particularly the latter. There are four longitudinal orange-yellow stripes of equal width and length on dorsum of body, extending from anterior portion of mesothoracic segment to twelfth segment, on which they unite in the orange-yellow coloring of dorsum of that segment; at least the two median ones unite, but the lateral ones are separated by a broken irregular black line with a pale border. These orange stripes are all the same distance apart; between them is a silvery gray area, three of these areas in all, one median and one on each side, with longitudinal more or less broken but very clearly defined black lines, five lines being represented in each area, and the middle one being the least broken and most continuous. While these gray areas with black lines reach only upon the anterior edge of segment 12 (except the lateral ones, one black line from which continues over that segment as above stated), they reappear on anterior half of anal segment, being simply broken by the orange dorsum of the twelfth segment. There is a more or less broken longitudinal median black line on the ventral surface; and about two very interrupted ones, consisting largely of dots or sections of lines as do many of the above mentioned dorsal ones, with a gray background on each side at edge of venter. Rest of venter pale flesh-colored. Prolegs all equally developed, orange or yellowish. Larva with very few hairs on body, almost naked, the most hairs being about mouth parts on anterior edge of head, and on legs. Length [much shrunken], 22 mm.

One specimen found on ground beneath scrub oak foliage, Nov. 26, 1892, in north end of Organ mountains, southeast of San Augustine and well up from base of mountains. General color noted in life. [No. 360].

(e) A MODERATELY LARGE, STOUT, RATHER THICKLY LONG HAIRY BLACK, YELLOW AND ORANGE LARVA. Head a little narrower than segments, chitinous, wholly black and polished, the clypeus pale. Three well developed pairs of thoracic legs, chitinous, shining polished black. Five pairs of black hairy prolegs on usual segments. Segments nearly all same width, anal hard-

ly narrowed; 2 to 6 short and equal; 7 to 12 very distinctly longer, nearly equal; anal still longer. Segments 2, 3, 5, 6, 9, 11 and 13 black, except the anterior and posterior edges of 3 which are narrowly yellow; the black of these segments continues on the venter, but is supplemented with yellow on anterior and posterior edges; 4, 7, 8, 10 and 12 yellow with orange-colored chætiferous tubercles, while the black segments have shining black tubercles, with a steel bluish or purplish luster. All the segments except head bearing long black bristly hairs from the tubercles, the head with a few hairs along edge and several very short ones on dorsum. Three thoracic segments with six dorsal tubercles, all the other segments except anal with twelve; 2 with six black tubercles; 3 with the two median and one lateral on each side black, and the one sublateral on each side orange; 4 with all six orange; tubercles on other segments are all concolorous with those segments. The posterior median pair of tubercles on 5 to 12 each bears a dense brush of short bristles of same color as the tubercle from which they spring, in addition to the long bristly hairs. Anal segment with six anterior, and six smaller posterior black tubercles, the posterior three on each side not in a transverse row like the anterior ones, but arranged in a triangular form. There are some small tubercles also on lateral edges of venter. Length, 28 mm.; greatest width, 8 mm.

One specimen found on rock beneath scrub oak foliage, Nov. 12, 1892, half way up the side of the Organ mountains above Modoc mine. Colors noted in life. [No. 327].

NOTES ON HEMILEUCA.

By C. H. TYLER TOWNSEND.

HEMILEUCA ARTEMIS Packard. A note was published on this species in *Can. Ent.*, 1892, pp. 199-200, under name of *H. juno* (?). A pupa obtained from larvæ on *Populus fremontei* in June, 1891, and sent to Dr. Packard had disclosed the moth, which Dr. Packard wrote was probably *H. juno*. Under date of April 29, 1893, Dr. Packard again wrote that this was apparently

a new species, which he would name as above. What appeared to be the same larvæ were found at that time, June, 1891, on *Salix longifolia* also. On Nov. 13, 1892, I found in the Alameda, north of Las Cruces, an egg-mass of *Hemileuca* encircling a twig of the above *Salix*. The next day I found two more of the egg-masses on the *Salix* in the same locality, and, what was more, I saw on, or flying about the *Salix*, several moths of *Hemileuca*, one of which I captured. This was sent to Dr. Packard, who wrote that it was "with little doubt *H. maia*." I had expected it would prove to be *H. artemis*, and I was therefore somewhat disappointed. Several more moths, apparently the same but not captured, were seen during the latter part of November flying about cottonwoods south of Mesilla Park.

It had occurred to me that possibly the larvæ which feed here on *Salix* are *H. maia*, while those on *Populus* are *H. artemis*. This conclusion is shaken by the fact that I have taken the larvæ of *H. maia* on mesquite, and they are much darker (reddish, brownish or grayish) than those taken on *Populus* and *Salix* in June, 1891, and lack the yellowish or greenish shades of the latter. From the general darker color of the *maia* larva, I believe I can distinguish the two species as they occur here. According to this separation, I find that *H. artemis* feeds here on *Populus* and *Salix*, while *H. maia* feeds on *Populus*, *Salix* and mesquite (*Prosopis juliflora*). The following notes apply to the lighter greenish and yellowish larvæ, which are those of *H. artemis*:

June 15, 1891. A good number on *Salix longifolia* in the Alameda. Fully grown or nearly so. Migrating.

June 24, 1891. Several specimens on *Populus fremontei* in Alameda. Nearly and quite fully grown.

June 30, 1891. Three more on *Populus* in Alameda. Nearly grown. None on *Salix* where they were found June 15.

May 22, 1892. A number found on a large tree of *Salix* (not *S. longifolia*), about 3 miles south of Mesilla. Yellowish in color, and about half grown.

May 31, 1892. Numerous on *Populus fremontei* just north of Las Cruces. Nearly two-thirds grown.

June 13 to 15, 1892. Many larvæ, from two-thirds to nearly fully grown, were found on *Populus fremontei* in the Rio Grande

bottoms between Las Cruces and Rincon, and on up the Rio Grande valley to Los Palomas, N. Mex.

June 29, 1892. A good number found north of Winslow, Arizona, on short Salix sprouts in the bottoms of the Little Colorado river. They were about fully grown, and the leaves of the Salix were entirely gone.

HEMILEUCA MAIA Drury. As will be seen from the above notes, it seems that the female of this species oviposits here on Salix, or other food-plants, in November, the eggs hatch the following spring. Below are notes on the darker larvæ, supposed to be maia.

April 22, 1891. A twig of *Populus fremontei* was found on college farm, bearing egg-shells of *Hemileuca* from which the young caterpillars, $2\frac{1}{2}$ to 3 mm. long, had just hatched and begun eating the green leaves. As these were so young, the color could hardly be depended upon. Mr. H. G. Dyar identified them as *Hemileuca* or an allied form.

May 16, 1891. Three miles south of Mesilla, near the Rio Grande river, a mass of dark *Hemileuca* larvæ was noticed on a twig of *Populus fremontei*, and another similar mass on a twig of *Salix* sp. near by. The larvæ held on to the twigs by means of slight but quite strong silken webs, and measured 17 to 20 mm. in length.

May 13, 1892. Some larvæ, which agree well in general color and appearance with the above, were found on mesquite (*P. juliflora*) near the college. They were $1\frac{1}{2}$ to 2 inches long. One larva pupated on top of the earth in a breeding cage, May 27. This, with an alcoholic larva, was sent to Dr. Packard, who wrote that they were *H. maia*.

July 25, 1892. East of Navajo Springs, Arizona, I found a number of specimens of a large brownish and blackish larva, which may be *H. maia*, feeding on *Artemisia filifolia*, a greenish gray sage. They could not be found on the sage after passing a certain very restricted area, though they were numerous where they did occur. It may have been another species.

Note. I have repeatedly handled the maia and artemis larvæ in all stages, without being stung in the least by the hairs.

THE PEACH AND APRICOT BORER OF SOUTHERN NEW MEXICO.

BY C. H. TYLER TOWNSEND.

This borer has been referred to by the writer, first in the Rio Grande Republican (of Las Cruces, N. Mex.) for April 24, 1891, under the name of *Ægeria exitiosa*; and second in Bulletin 3 of the N. Mex. Agricultural Experiment Station, pp. 13-15, published in June, 1891, where it is called *Sannina exitiosa*.

As it is by no means certain that this borer is *S. exitiosa*, since it has never been bred, I present the following description of the larva, which will enable its identification at some future time. *Sannina pacifica* Riley bores the peach in California, and it is probable that our species is either this or *S. exitiosa*. But it is possible again that it may be another species. It seems to be less hairy than the larva of *S. exitiosa*, according to Harris' figure.

Description of larva. Length, 12 to 13 mm. Whitish, head reddish brown. Broadest anteriorly, gradually narrowing to anal extremity. Head corneous, slightly narrower than next segment, semicircular in outline from above, with a dorsal Y formed by two depressed lines meeting behind, the Y being open anteriorly. Two bristles, one behind the other, on each prong of the Y anteriorly. A transverse row of four short bristles just anterior to where the Y forks, the inner ones shortest. Front border of head, and ends of mandibles, blackish. Antennæ 2-jointed, short, joints cylindrical, first joint twice as wide and twice as long as second, the second terminated by a bristly style. Four (in one case 5) small black dots on outer edge of head on each side just posterior to antennæ, representing the eyes, with two (in one case one) ventrad and at base of antenna below edge. Four bristles, two long and two short, in this region posterior to antennæ on edge of head, not connected with the black dots. A pair of short bristles a little dorsad of antenna. Two bristles on underside below the dots at edge of head. Mandibles 3 or 4-toothed, the fourth tooth not so distinct as the anterior three. Maxillæ 3-jointed, if the two larger and longer solerites at the base of each be excepted; first joint hardly longer

and hardly stouter than second, third joint hardly more than one half as long and one half as wide as second. Second joint bearing a bud-like apparently single-jointed palpus. Spinneret 2-jointed (?). A short bristle near base of each maxilla. Second segment subcorneous, moderately smooth; other segments fleshy, with very scant hairs, deeply wrinkled, and minutely rugose or punctured. Segments except head with three minute lateral, and (except 2d segment) four dorsal, tubercles; the lateral longitudinal wrinkle in the integument of each segment roughened, having the appearance of being furnished with small sunken horny plates. Three pairs of true legs; each 4-jointed, not including the blackish apical hook. Four pairs of prolegs, on segments 7 to 10; also an anal pair less developed on anal segment. Spiracles on second and twelfth segments large and conspicuous, smaller on segments 5 to 11.

Described from two alcoholic specimens, taken from a peach tree near root, April 14, 1891, in Judge G. W. Wood's orchard, near Mesilla, N. Mex. The same species was taken from apricot in same orchard, April 6, 1891. Color noted in life.

FRUITS ALL THE YEAR ROUND

A POPULAR AND PRACTICAL SYNOPSIS OF TEMPERATE AND EXTRA-TROPICAL FRUITS.

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Continued from page 45.

CARYA (Juglandaceæ).—Continued.

C. TOMENTOSA Nuttall. Mockernut or white-heart hickory. Canada, southward. Nut small, sweet, oily. "A variety produces nuts as large as a small apple, called king nuts."

CASHAW-TREE—see *Prosopis juliflora*.

CASIMIROA EDULIS L. & L. Mexico, up to the cool heights of 7,000 feet. Tree thrives well at Santa Barbara, Cal.; comes into bearing at ten years, producing an orange-like fruit, about an inch in diameter, pale yellow, of a rich subacid flavor, most palatable when near decay. The ZAPOTE of the Mexicans. The pulp of a delicious, melting peach-like flavor, according to Garner, while Hernandez states that the kernel is deleterious. The fruit is said to induce sleep. Efforts to propagate by cuttings have proved unsuccessful, and the seeds do not seem to reach perfection in California.

CASSAVA—see *Manihot utilissima*.

CASTANEA (*Cupuliferæ*).

The chestnut is a native of the south of Europe and temperate Asia, as far as Japan, and a variety to North America. The varieties cultivated are all of the same species. The following are worthy of special note:

1. American Sweet. Succeeds well in the foothills of California. The wood lighter in color than that of the red oak, of greater durability and beauty; the nuts small but sweet.
2. Italian—see Spanish.
3. Japan Mammoth. Tree bears when quite young, producing a monster fruit—the largest chestnut known; of equal flavor with the American Sweet.
4. Maron Combale. Large; kernel rich and sweet; excellent.
5. Maron de Lyon. The largest French variety; roundish, sweet and well flavored; a prolific variety.
6. Numbo. Originated with Samuel C. Moon, of Pennsylvania, who says: "Numbo is a seedling of the European chestnut; the original tree is now 40 feet high, is enormously productive, and bears every year. The quality of the nut is equal to that of any of the large chestnuts, and when boiled or roasted they can scarcely be distinguished from the American sweet chestnuts. The trees are perfectly hardy, never having been injured in the least by any of the severe winters during the past thirty years. Grafted trees usually commence to bear three or four years after grafting."
7. Spanish. A large, sweet nut, but variable in size and quality, as the trees are raised from the seed. A highly ornamental tree of free growth.

C. VESCA Gærtner—see *C. sativa*.

C. VULGARIS Lamarck—see *C. sativa*.

CASTANOPSIS (*Cupuliferæ*).

Several species of this genus produce edible nuts like chestnuts.

C. ARGENTEA. A lofty tree of India, bearing edible nuts.

C. CHRYSOPHYLLA. The western chinquapin, or oak-chestnut; attains a height of 150 feet, and a diameter of eight feet; wood durable, ornamental.

C. INDICA. Oak-chestnut of India; nuts with the taste of filberts; found in mountains at an elevation of 4,000 feet.

CERATONIA (*Leguminosæ*).

C. SILIQUA Linne. The carob tree, also known as algaroba or St. John's bread, is a tree of wide utility in the Mediterranean region, and equally well adapted for portions of California. A handsome evergreen, dioecious tree, that may be grown from seed or propagated by grafting, and bearing at ten or twelve years. The fruit is largely fed to stock, containing about 66 per cent. of sugar and gum. The meat of sheep and pigs is said to be greatly improved by feeding these pods, and the fattening properties are twice those of oil cake.

CEREUS (Cactaceæ).

A large variety of Cerei produce edible fruit, especially *C. Engelmanni*, *C. giganteus* (the giant cactus), *C. Quixo*, *C. gummosus*, *C. Thurberi*, and many others. *C. Engelmanni* bears a fruit with the flavor of a strawberry.

CHERIMOYER—see *Anona cherimolia*.

CHERRY—see *Prunus avium* and *P. cerasus*.

CHERRY, BLACK—see *Prunus serotina*.

CHERRY BLOSSOM. The national flower of Japan.

CHERRY, CAPSICUM—see *Capsicum baccatum*.

CHERRY, CHOKE—see *Prunus demissa* and *P. virginianus*.

CHERRY, LAUREL—see *Prunus Lauro-Cerasus*.

CHERRY-LICE—see *Myzus cerasi* in entomological works.

CHERRY, PLUM—see *Prunus cerasifera*.

CHESTNUT—see *Castanea vesca*.

CHESTNUT, CHINESE—see *Trapa*.

CHINESE DATE—see *Lichne nut*.

CHINQUAPIN, WELTERN—see *Castanopsis chrysophylla*.

CHOCHO—see *sechium edule*.

CITRON—see *Citrus*.

CITRUS (Rutaceæ).

The Citrus fruits, so called, belong to this large genus. The many varieties through cultivation have lost many of their specific characteristics, which renders classification difficult. Some botanists refer, for instance, both the orange and the lemon to the same species (*C. aurantium*); but for the present work it is deemed best to maintain the rank of species for many forms worthy only of varietal rank.

C. AURANTIUM L. The orange. For a sketch of the history, cultivation and varieties of this "Queen of Fruits," reference is made to the WEST AMERICAN SCIENTIST, vol. VII, pp. 109-114.

C. AUMIA RISSO. A variety of *C. medica*. "The sweet lemon, including the pear-shaped lemon with large pear-shaped fruit. Rind thick and pale; pulp not acid. This variety serves for particular condiments." (Mueller.)

C. AUSTRALASICA Mueller. A shrub of eastern Australia, with oblong or nearly cylindrical fruits of lemon-like flavor, 2 to 4 in. long. (Mueller.)

C. AUSTRALIS Planchon—see *C. Planchoni*.

C. BERGAMIUM RISSO. Fruit large and rough, flattened, ornamental only; Bergamotte oil is obtained from the rind; oil is also obtained from the flowers. The Mellarosa variety furnishes a superior oil and exquisite confitures. (Mueller.)

C. BIGARADIA Duhamel. "The bitter orange; its flowers furnish the Neroli oil, so delicious and costly a perfume. It is stated that orange flowers to the value of fifty pounds sterling might be gathered from the plants of an acre within a year. The rind of the fruit is used for candied orange peel. Bitter principle: hesperidin in the rind; limonin in the seed." (Mueller.)

C. CEDRA Galesio. The true citron. There are numerous varieties, the

Madras being considered by some the largest and best variety. The Amalfi, Serrento and Calabria varieties are being tested in California, but these citrons of commerce are imperfectly described and little known. Essential oil and citric acid can be obtained from this fruit, irrespective of the ordinary culinary use. A large variety, with thick rind, furnishes (candied) the citronate or succade. The cedra oil comes from a particular variety.

C. DECUMANA Linne. Known as the Shaddock, Pomelo, Grape Fruit, and by various other names in different localities. It was introduced from China to the West Indies by Capt. Shaddock, hence one of its common names. There are several varieties, all with large fruits, the largest of which, in some varieties, weigh from ten to twenty pounds each.

The Pomelo or Grape Fruit bears large fruit from two to five pounds each in weight, pale yellow, resembling the citron. Skin smooth, juice subacid. A variety of Shaddock.

The common variety of Shaddock is a dwarfish ornamental tree, bearing very large fruit, weighing six or eight pounds each, with smooth skin, pale yellow and very glossy. Rind thick, spongy, and very bitter. The fruit makes a magnificent appearance in a collection of tropical fruits, resembling a mon trous orange, but is more showy than useful, as the pulp is comparatively tasteless.

Popamus or Pumalo of India. Fruit four pounds apiece when well developed. "The grand thin-skinned and red-fleshed varieties that are cultivated near Bombay are very delicious and wholesome if eaten in the morning with salt or sugar."—G. Marshall Woodrow.

C. DELICIOSA—see *C. nobilis* (by some considered a synonym of *C. madurensis* instead).

C. DULCIS Volkamer. The oils of Neroli and Bergamot are expressed or distilled from orange blossoms. The fragrance of orange blossoms is very agreeable, and is thus utilized by perfumers. In the poetic language of flowers the orange blossom is the emblem of chastity, and is the recognized bridal flower among English speaking people. *C. dulcis* is the sweet orange, of which so many kinds occur, those described under *C. aurantium* belonging here. The St. Michael is taken as a type of the species.

St. Michael. The "paper rind," is a small, round orange, very firm and juicy, and with very thin pale-colored skin. Ripens late, keeps well on the tree, and does not drop when mature. This orange is from the Azores. The tree is dwarf, and a prolific bearer. The Azorean St. Michael is a larger tree, a rapid grower and very prolific also. The fruit ripens early, keeps well on the tree; few seeded, larger than the "paper rind" St. Michael, solid, flattened in shape. The pulp is fine and melting and the rind medium thin.

C. JAPONICA Thunberg. A shrubby Japanese species, better known under the following name:

Kumquat. The very small, oblong or olive-shaped fruit of this bushy tree is peculiar in being edible throughout—rind and all. The rind is thick, yellow, smooth, and sweet-scented. The pulp contains many seeds. Prolific, but more odd than useful, as there is very little pulp about the fruit.

C. LIMETHA. The sweet lime; skin tight, smooth and very thin, of a pale yellow ultimately, inclosing very pale, sweet juice without piquant flavor. Widely but not extensively grown in India, chiefly from seed.

C. LIMETTA RISSO. The true lime. A shrub useful for hedges, from which the best lime juice is obtained. A few of the best known varieties are:

1. Perette.
2. Dulces.
3. Mexican.
4. Persian.

C. LIMONIUM RISSO. The true lemon. The lemon is now attracting the attention of growers very widely, and any information about this fruit will therefore be interesting at the present time. While its near relative, the orange, has been the subject of many articles and books, this equally useful fruit is as yet possessed of a meagre literature.

The true lemon is the fruit of *Citrus limonium*, a variety of *C. medica* (the citron, in the widest sense of the word). It is indigenous to northern India.

The lemon is less hardy than the orange and requires a frostless situation or a locality nearly free of frost. In favored situations the lemon will blossom and bear fruit throughout the entire year, and as the area that can be devoted to lemon culture is smaller than that available for orange growing, the business offers yet greater inducements.

SOIL.—The lemon delights in a sandy loam, but thrives in other soils. If the stock used is a seedling orange the soil best adapted to the orange will yield satisfactory returns, and in selecting either the land or the stock this should receive consideration. The orange, or the lemon, while doing well on low ground in our valleys, is now generally conceded to do better on our warmer hillsides and mesas, where freer from frost. The moderating influence of proximity to salt water, says Wickson, is an element favoring the lemon grower.

LEMON CURING.—It has been fully demonstrated that the lemon can be successfully grown in Southern California and that the product is the equal of the imported fruit and the superior in quality of much of the foreign grown article. The lemon, as taken from the tree, is not in condition for marketing, and the science of curing and packing must be as thoroughly mastered as the art of growing a superior article, to secure a required grade of merchantable fruit.

Cut, not pull, the fruit whenever it gets to a merchantable size, and as soon as the faintest approach of the yellow color is discernible.

Handle very carefully and tenderly, as the least bruise will develop

into decay in a very short time. Wrap the fruit singly in paper and place in shallow boxes, not over two deep, and cover closely, carefully excluding light and air for three or four weeks. Then open out and dry the fruit, re-wrap in paper and keep in a building at a low temperature until finally ready to market.

A simple and sometimes as satisfactory method is to gather the fruit in piles under the trees, where it will be completely shaded by the foliage, covering the fruit with a thin layer of straw or other light material. This open-air curing progresses well, the fruit becoming beautiful in color and of excellent quality, if of a good variety. There are half a dozen methods that yield good results, and doubtless future experiences will develop improvements on existing methods. If gathered at the right moment, "as the color begins to turn, lemons may be kept for months, and they will improve in market qualities, by a thinning and toughening of the skin, and by increase of juice." The Sicily process for curing lemons consists principally of a six months sweat in a shady place. A moist atmosphere, cool storage and protection from light and drafts of air seem to be vital points.

TO BE CONTINUED.

SEVENTEEN-YEAR LOCUST.

During the present year two broods of the periodical cicada or so-called "seventeen-year locust" (*Cicada septendecim*), one of the seventeen-year race and one of the thirteen year race, will make their appearance in different parts of the country. Prof. C. V. Riley, U. S. entomologist at Washington, D. C., would be glad of evidence as to the appearance or non-appearance this year of the insects in the localities noticed below.

THIRTEEN-YEAR RACE is expected in Lowndes Co., Alabama; Cobb and Cherokee Cos., Georgia; Lincoln Co., Tenn.; Lincoln and Moore Cos., N. C. Any evidence giving the extent of territory over which they appear in your county or state, or any well attested dates of their appearance in previous years, will be thankfully received and appreciated, regarding either this or the following:

SEVENTEEN-YEAR RACE. The appearance of this in Colorado, Kansas and Kentucky would be especially interesting. Expected in portions of North Carolina, Virginia, District of Columbia, Maryland, Indiana and Illinois.

EXHIBIT OF THE GERMAN KALI WORKS.

Among the agricultural exhibits at the World's Fair one of the most interesting is that of the German Kali Works, in which the products of the great potash mines are displayed. These mines are located at Stassfurt, Germany, and furnish, as is well known, nearly the entire supply of potash—a valuable plant food and ingredient of every complete fertilizer. The potash coming from this source is found in large quantities in the form of solid masses of potash salt, most of which are subjected to a manufacturing process by which they are concentrated and made ready for use. The ex-

hibit comprises a full collection of these minerals, which are highly interesting to the geologist and agricultural student.

There are many varieties of crude potash salts, differing in their chemical composition, among these Carnallite and Kainit are the most important. From these are manufactured the concentrated salts, such as muriate of potash, sulphate of potash and many other chemicals.

All these products are fully displayed at the exhibit, as well as photographs of the mines and maps showing and illustrating their location. Especially interesting to the agriculturist are various illustrations of experiments and graphic tables revealing in a striking manner the beneficial effect of potash upon crops and the important part which this element plays in plant nutrition.

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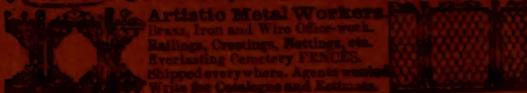
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