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*Gossypium Harknessii* x *G. Thurberi* (W 96) in 1939.

Herbarium specimens from 17  $F_2$  plants at Riverside and Palm Springs were the basis of the grading. Of these only 12 had flowers, and good seeds were available from only 4 plants. Even as regards the vegetative characters, the population is too small to permit definite conclusions as to the segregation. The classification of the parent species and the limited material of the  $F_1$  and  $F_2$  populations, is as follows:

Character	:Hark.	:Thurb.	: $F_1$	: $F_2$	
Twigs, cross-section	terete	x	:	:	8
	intermediate	:	:	x	9
	quadrangular	:	x	:	
		:	:	:	
Leaves, lobation	very shallow	x	:	:	6 $\frac{1}{4}$
	intermediate	:	:	x	9 $\frac{2}{4}$
	very deep	:	x	:	2
		:	:	:	
Leaves, apex	short (and not sharply) acuminate	x	:	:	1
	intermediate	:	:	x	7
	long (& sharply)acum.	:	x	:	9
		:	:	:	
Leaves, midlobe constriction	none	x	:	x	6
	intermediate	:	:	x	7 $\frac{2}{4}$
	pronounced	:	x	:	4
		:	:	:	

$\frac{1}{4}$  of these approach intermediate.

$\frac{2}{4}$  of these approach the Thurberi condition.

$\frac{3}{4}$  One of these approaches Thurberi.

*Gossypium Harknessii* x *G. Thurberi* (W 96) in 1939.

Character	:Hark.	: Thurb.	: F <sub>1</sub>	: F <sub>2</sub>
Peduncle nectaries	none	x		1
	intermediate <sup>4/</sup>			6
	large		x	x 9
Bractlet persistence	deciduous at or before anthesis	x		2
	intermediate			1(7 ?)
	persistent to boll maturity		x	x 4(6 ?)
Bractlet length	15 to 25 mm.	(10 <sup>x</sup> to 25)		10
	10 to 15 mm.		x (about 15)	3
	10 mm. or less		x (7 to 15)	
Bractlet width	11 to 15	(7 <sup>x</sup> to 15)		
	6 to 10		x (6)	9
	2.5 to 5		x	4 <sup>5/</sup>
Bractlet, shape	oblong to ovate	x		x 12
	broadly lanceolate			x 2
	narrowly "		x	
Calyx glands	few	x		2
	intermediate			x 5
	many		x	6

<sup>4/</sup> Occasional or small.

<sup>5/</sup> These all 5 mm. wide.

*Gossypium Harknessii* x *G. Thurberi* (W 96) in 1939.

Character	: Hark. :	Thurb. :	F <sub>1</sub>	: F <sub>2</sub>
Petal color	yellow	X	x	11
	ochroleucous	:	:	1
	white	:	x	:
Seed Shape	plump-obovoid	x	x (less plump)	3
	intermediate	:	:	2 ?
	angulate-turbinate	:	x	1
Seed pubescence <sup>6/</sup>	dense, closely appressed	x	x	4
	intermediate	:	:	:
	sparse and loose	:	x	1

<sup>6/</sup> In 3 of the F<sub>2</sub> plants the hairs are pale brown (*G. Armourianum* character).

*Gossypium Harknessii* x *G. Thurberi* (W 96) in 1939.

Evidence of dominance.

Considering the expression in  $F_1$  and the classification of  $F_2$  partial dominance is indicated as follows:

Harknessii character: twig cross-section, bractlets length, bractlets shape, petal color, seed shape, seed pubescence, and (probably) boll shape.

Thurberi character: leaf apex, peduncle nectaries, calyx glands, and (probably) bractlet persistence.

In respect to leaf lobation, midlobe constriction, and bractlet width, dominance of neither parent is indicated.

Yellow petal shows a more pronounced tendency to dominance than in the hybrid *G. Armourianum* x *G. Thurberi*.

Leaf-acumination shows dominance of the Thurberi condition in both hybrids.

Presence of peduncle nectaries (Thurberi character) shows dominance in the cross with Harknessii, but not in the cross with Armourianum.

Persistent bractlets (Thurberi character) is apparently dominant in the cross with Harknessii, whereas it was recessive in the cross with Armourianum. It should be remembered, however, that in *G. Harknessii* the involucre usually persists until anthesis, whereas in *G. Armourianum* it is caducous much earlier.

In  $F_1$ , so far as could be judged from dried specimens, the petals were yellow (nearly as yellow as in *G. Harknessii*), the petal spot was reduced to

*Gossypium Harknessii* x *G. Thurberi* (W 96) in 1939.

a few short interrupted streaks,<sup>1/</sup> and the pollen was pale yellow. The leaves were cleft to about  $2/3$  of the distance from apex to base. The bractlets were broadly lanceolate or narrowly ovate, and entire to deeply few-dentate. The calyx was very shallowly dentate with broad blunt teeth, hence approximately intermediate. The bolls were relatively wider than in *G. Thurberi*, the valves with an abrupt acumination longer than in that species. <sup>2/</sup> The seeds were very like those of *G. Harknessii* in pubescence and shape, but were less plump.

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<sup>1/</sup> *G. Harknessii* as represented by C.E. 861 has spotless petals, but Brandegee's original description of the species gives them as spotted.

<sup>2/</sup> In the few  $F_2$  plants that had bolls, these were nearer *Harknessii* than *Thurberi* in shape.

*Gossypium Harknessii* x *G. Armourianum* (W 41) in 1939.

The characters of the parent species are as given in Jour. Wash. Acad. Sci. 23: 599-560, and in Jour. Heredity 25: 305, figs. 7 and 8. For  $F_1$  and  $F_2$  the characters were taken from herbarium specimens collected at Riverside and Palm Springs. Of the 23  $F_2$  plants, only 7 or 8 afforded material for grading the characters of the involucl and calyx, only 6 had capsules (these old), and only 1 had seeds. Based on this very limited material, the classification is as follows:

Character	: Hark. :	Arm. :	$F_1$ :	$F_2$ :	
Twigs, color	{	reddish brown	: x	: x	: 8
		intermediate	:	:	: 6
		grayish brown	: x	:	: 9
			:	:	:
Young parts, pubescence	{	obscurely and very finely puberulent	:	: x	: 13
		intermediate	:	: x	: 2
		densely puberulent	: x	:	: 8
			:	:	:
Stipules, length	{	1.5 to 2.5 mm.	:	: x	: 12
		intermediate (+3)	:	:	: 3
		3 to 6 mm.	: x	:	: 7
			:	:	:
Leaf-blades, thickness	{	very thick	:	: x	: 3
		intermediate	:	:	: 4
		relatively thin	: x	:	: x : 15
			:	:	:

*Gossypium Harknessii* x *G. Armourianum* (W 41) in 1939.

Character	: Hark. :	Arm. :	F <sub>1</sub> :	F <sub>2</sub> :	
Leaf-blades, length	2 to 3.5 cm.	:	x	:	18
	intermediate	:	:	x	5
	4 cm. or longer	x	:	:	:
Leaf-blades, lobation	not lobed	:	x	:	11
	very shallowly lobed	:	:	x	7
	distinctly lobed	x	:	:	5
Leaf-blades, venation	7-veined	x	:	:	9
	intermediate (5 to 7)	:	:	x	12
	5-veined	:	x	:	2
Leaf-blades, base	subcordate, sinus open and broadly triangular	:	x	:	3
	intermediate	:	:	x	12
	deeply cordate, sinus narrow, often partly closed	x	:	:	8
Leaf-blades, apex	rounded to acutish	:	x	x	17
	intermediate	:	:	:	4
	acute to short-acuminate	x	:	:	2
Peduncle, length	20 to 40 mm.	:	x	:	2
	intermediate	:	:	:	3
	5 to 12 mm.	x	:	x	5

## Gossypium Harknessii x G. Armourianum (W 41) in 1939.

Character	: Hark. :	Arm. :	F <sub>1</sub> :	F <sub>2</sub> :	
Bractlets, persistence	{ very fugacious	:	x	:	1
	{ intermediate	:	:	x	5
	{ persistent, usually until anthesis	x	:	:	2
Bractlets, length	{ 2 to 5 mm.	:	x	:	2
	{ intermediate	:	:	x	2
	{ 10 to 25 mm.	x	:	:	3
Bractlets, width	{ 0.5 to 1 mm.	:	x	:	2
	{ intermediate	:	:	x	4
	{ 7 to 15 mm.	x	:	:	1
Bractlets, shape	{ subulate	:	x	:	
	{ intermediate (lanceolate)	:	:	x	4
	{ ovate or oblong-ovate	x	:	:	3
Calyx, margin	{ 5-dentate	:	x	x	8
	{ intermediate	:	:	:	
	{ undulate to denticulate	x	:	:	
Calyx, glands	{ many	:	x	x	7
	{ intermediate	:	:	:	1
	{ few	x	:	:	

*Gossypium Harknessii* x *G. Armourianum* (W 41) in 1939.

Character	: Hark.	: Arm.	: F <sub>1</sub>	: F <sub>2</sub>	
Capsule, shape	ovoid, acuminate	:	x	:	1
	intermediate	:	:	:	2
	nearly spherical, rounded or apiculate	x	:	x	3
		:	:	:	
Capsule, ciliation	sparse or none	:	x	:	2
	intermediate	:	:	x	
	copious	x	:	:	3
		:	:	:	
Seeds, shape	narrowly obovoid	:	x	:	1
	intermediate	:	:	:	
	broadly obovoid	x	:	x	
		:	:	:	
Seeds, hair color	pale brown	:	x	x	1
	intermediate	:	:	:	
	silvery gray	x	:	:	
		:	:	:	

*Gossypium Harknessii* x *G. Armourianum* (W 41).

As determined on herbarium specimens from a plant grown at Riverside in 1939,  $F_1$  approached *G. Harknessii* in 5 characters, approached *G. Armourianum* in 4 characters, and was more or less intermediate in 10 characters. The  $F_2$  population was much too small to permit conclusions as to the manner of segregation, but partial dominance is indicated in respect to the following characters:

*Harknessii* character apparently dominant: leaf thickness, leaf venation, leaf base, peduncle length, bractlet shape, capsule shape.

*Armourianum* character apparently dominant: leaf length, leaf lobation, leaf apex, calyx margin, calyx glands.

Gossypium sp.


(Described from C.B. 864, row 8, plant 12, Rubidoux Laboratory, Riverside, September, 1938).

Apparently related to G. Palmeri <sup>CB. 1145</sup> but branches more spreading and leaves often reduced to 2 lobes or entire. Bracts <sup>CB. 1145</sup> much as in G. Palmeri, deeply lacinate with numerous long teeth, but smaller and the teeth more slender. Calyx deeply and irregularly dentate with numerous teeth of unequal size and length; oil-glands rather few but conspicuous, black. Corolla (wilted) 2.5 cm. long. Petals apparently pale yellow, with conspicuous spots. Bolls 4-lock, about 3 cm. long, plumply ovoid, rather abruptly short-acuminate, the surface roughish but not pitted, the oil-glands evident but buried. Lint fox-brown, very short. Seeds black, without differentiated fuzz-hairs.

(Plant #11 in Row 8, also under C.B. 864, may be a hybrid with G. hirsutum. The 4-lock bolls are much larger than in plant #12 and the lint is buff-colored).

Gossypium Palmerii Watt (?)

(Described from C. B. 1145, 3 plants, Riverside, September, 1938).

Young bark green tinged with red, old bark light gray. Vegetative branches stiff, erect or narrowly ascending; fruiting branches short, 2- or 3- (seldom 4-) flowered. Leaf-blades deep green with liver-colored pulvinus, sparsely ciliate and with a few hairs on large veins beneath, otherwise glabrous (as are the young branches), 3- to 5-parted with narrowly lanceolate, long-acuminate lobes, the basal pair, when present, usually much less than 1/2 as long as the principal lateral lobes, midlobe and often principal lateral lobes coarsely few-toothed or cleft, midlobe strongly constricted at base; basal sinus very small and very shallow, open; nectary near base of midlobe only, small, deltoid to nearly circular; petiole nearly as long as the blade. Bractlets cordate-ovate, 3.5 to 4 cm. long, deeply lacinate with 4 or 5 long, setose-subulate teeth. Peduncle nectaries none or rudimentary. Calyx shallowly dentate with broad deltoid teeth, oil-glands rather numerous on lower half of calyx, very few above middle. Corolla about 4.5 cm. long, open-campanulate; petals ochroleucous with a well-developed spot (grade 6 to 7), broadly emarginate at apex . Column about 12 mm. long, antheriferous to base. Filaments (lower) about 4 mm. long, white. Anthers and pollen cream-colored. Pistil 24 to 28 mm. long above ovary, the exerted portion about 1/2 of the total length, white with few dark-purple oil-glands; stigmas erect, closely coherent. Bolls 3- or (mostly 4-) lock, about 26 mm. long, ovoid-globose, apiculate, smooth, the oil-glands apparent but buried. Lint white.

Gossypium Palmeri Watt (?)

C. B. 864 is evidently related but has more spreading branches and the leaves are often reduced to one or two lobes. Also, the lint is brown.

G. Schottii (C.B. 872) also seems related to <sup>C.B. 1145</sup>~~G. Palmeri~~ but the herbage is strongly tinged with purple and is much more pubescent; also the leaf-lobes are broader and more lacinate and the basal ones are more developed.

Watt's description of his G. Palmeri (p. 204) differs from C.B. 1145 in having "conspicuous cavernous glands on the apex of the pedicels"; minute bractlets occasionally present within the involucre; leaves entire or 3-parted; flowers scarcely one inch in length; corolla scarcely exceeding the bracteoles, pale lemon-yellow, without spots; calyx truncate; bolls warty.

*Gossypium Raimondii* Ulbr.

(C.B. 1223, 1224)

See letter to T. H. Kearney dated June 4, 1938, from Teodoro Boza-Barducci of the Est. Exp. Agr. de la Molina, Lima, Peru, enclosing photographs showing habitat of this species, several plants and details of plant-parts.

Boza-Barducci wrote: "The Chilete zone may be the main natural habitat for this species." He supposes it to be closely related to G. Klotzschianum Anderss. and states that "the cytologist from Trinidad" (Skovsted?) is also of that opinion.

## GOSYPIUM STOCKSII

H. Martin Leake & Ram Prasad in Mem. Dept. Agric.  
India, Bot. Ser. 4: 44. 1912.

One further type of cotton, G. Stocksii, M. Mast., is found in India and has formed the basis of some experiment. Seed of this type was obtained from wild plants found on the limestone hills around Karachi. Both G. arboreum and G. herbaceum have been crossed with this plant and in both cases seed was obtained. This seed germinated and gave rise to plants which have been grown for three seasons. They remained diminutive, however, and have died without producing any flowers, though the parent plants have flowered freely and subsequent generations have been raised from their seed. From this condition of complete sterility in the  $F_1$  generation it is but a short step to those cases in which attempts to produce a cross have resulted in complete failure.

G. Stocksii, though found wild in India, differs in a remarkable degree from the other members of the Asiatic (Indian) group of Cottons (subsectio Indica) as defined by Todaro.<sup>1/</sup> By Watt<sup>2/</sup> it is placed in a different section of the genus and the correctness of its inclusion in the Genus *Gossypium* even has been called in question.<sup>3/</sup> In this connection it is of some interest to find that, as far as experiments have been made, this plant forms the single instance of a cross between a member of the Asiatic series and other forms of cottons being produced.

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<sup>1/</sup> Osser. sui Cotoni, 1863.

<sup>2/</sup> Wild and Cultivated Cottons of the World.

<sup>3/</sup> Watt l. c. p. 56.

Characters	: Armourianum	: Thurberi	: F <sub>1</sub>
Twigs	: terete	: quadrangular	: rounded-quadrangular
Bark of twigs	: reddish	: reddish brown or : tinged therewith.	: tinged with reddish : brown.
" older	: light reddish brown	: light brownish gray	: brownish gray
Petioles	: terete	: quadrangular	: terete or nearly
Petioles (rel. to blades)	: as long or slightly : longer	: somewhat shorter	: mostly shorter
Leaf blades	: thick	: thin	: thick
" "	: shiny both faces	: not shiny	: shiny above
" " pubescence	: soon glabrous	: ciliolate, puberulent : on veins	: glabrous
" " margins	: not, or very obscurely : whitish	: rather conspicuously : whitish	: whitish-margined
" " lobation	: entire	: pedately 3-5-parted	: deeply 3- to 5-lobed
" " apex	: obtuse or acutish, : often mucronate	: attenuate-acuminate	: acuminate but obtuse : and often mucronulate
" " length	: up to 3.5 cm.	: up to 15 cm.	: 6.5 to 7 cm.
" " basal sinus	: open, broadly 3- : angular	: very open, triangular, : narrow at base	: very narrow at base, : open, triangular : above
" " nectary	: triangular, barely : 1 mm. long	: 1 to 4 mm. long, : triangular or : elliptic	: rounded deltoid : about 1 mm. long
Peduncle, nectaries	: none	: 2 or 3, often large	: large, at base of 2 : or all 3 bractlets
Involucrel	: caducous long before : anthesis	: persistent to maturity, : spreading	: deciduous long before : anthesis, slightly : spreading
" bractlets	: 2 to 5 mm. long	: 7 to 15 mm. long	: about 7 mm. long
Calyx, length at anthesis	: 5 to 10 mm.	: +4 mm.	: 5 to 6 mm.
" margin	: 5-dentate with 3 : angular or subulate : teeth	: usually merely undulate	: abruptly 5-dentate, : teeth deltoid, acute
Petals, color	: pale green-yellow	: white	: ochroleucous
" spots	: none or present	: none or present	: spotted in W8, faintly : in W9
Anthers, connective	: carmine, or dark : purple	: dull orange	: reddish brown
Pollen	: nearly apricot- : yellow	: white or cream	: on different plants : either cream, or : pale orange

Characters	: Armourianum	: Thurberi	: F <sub>1</sub>
Pistil, length above ovary	: 20 to 25 mm.	: 18 mm.	: 25 mm.
Pistil color	: white	: pale green	: white on one plant, pale green on another
" " oil-glands	: red-brown, or nearly black	: deeper green	: reddish brown
Ovules per locule	: ± 3	: usually 6	: 3

Characters	: barbadense	: Harknessii	: F <sub>1</sub>
Stipules	: persistent until leaf : nearly full grown	: caducous	: as in barbadense : less persistent on : one plant
" length and shape	: 10 to 20 mm., lanceo- : late	: 3 to 6 mm., subu- : late	: 12 to 18 mm., nar- : rowly lanceolate
Petioles	: very stout	: slender	: rather stout
" relative length	: mostly about as long : as blade	: about as long as : blade	: about as long as : blade
Leaf-blades, color	: dark green	: yellowish green	: deep bluish green
" " , lobation	: deeply 5-lobed	: shallowly 3-lobed	: rather deeply 3 : (majority) to : 5-lobed
" " , apex	: acuminate and (often : long-) mucronate	: short-acuminate, or : acutish and mu- : cronate	: long-acuminate, : mostly mucronate
" " , length	: up to 20 cm.	: up to 6 cm.	: up to 16 cm.
" " , midlobe	: oblong-ovate	: broadly deltoid	: ovate
" " , basal sinus	: deep, open 3-angular : below, narrow or : closed above	: deep, open triangu- : lar, or closed : above	: deep, open <del>3</del> tri- : angular below, : narrow or closed : much of length
" " , pulvinus	: greenish or brownish, : large	: greenish or brown, : very small	: dull brown or : reddish, small
" " , nectary	: 2 to 5 mm. long, often : on 3 veins	: less than 1 mm. : long, near base : midvein	: 1 to 2 mm. long, : usually on all 3 : veins
" " " , shape	: triangular or nearly : circular, often : irregular	: round, 3-angular, : or slit-like	: rounded-triangular
Peduncle, nectaries	: large, but apparently : often non-functional	: none	: 3, large, nearly : circular or inverted : delta-shaped

Characters	: barbadense	: Harknessii	: F <sub>1</sub>
Involucrel	: persistent to maturity	: persistent usually	: persistent after
	:	: until anthesis	: anthesis
" , bractlets	: separate or slightly	: separate	: separate
	: connate	:	:
" " , shape	: broadly ovate	: narrowly-ovate, or	: broadly deltoid-ovate
	:	: oblong-ovate	:
" " , base	: deeply cordate	: truncate or nearly	: moderately cordate
	:	:	:
" " , dentation	: lacinate on 2/3 of	: denticulate or few-	: lacinate on most of
	: margin with 3-angular	: dentate near apex	: margin with lanceo-
	: setaceous teeth	:	: late-setaceous teeth
	:	:	:
" " , length	: 35 to 45 mm.	: 10 to 25 mm. long	: ± 45 mm.
	:	:	:
Calyx, length (anthesis)	: about 8 mm.	: 6 to 8 mm.	: 8 to 10 mm.
	:	:	:
" oil glands	: many, very small,	: few, inconspicuous,	: very numerous, very
	: black	: greenish	: small, black
	:	:	:
" margin	: shallowly and very	: undulate or denticu-	: merely undulate
	: broadly crenulate	: late	:
	:	:	:
Petals, color	: yellow	: light green-yellow	: between Martini's and
	:	:	: picric yellow or
	:	:	: pale green yellow
	:	:	: (about 2 grades
	:	:	: lighter than
	:	:	: <u>barbadense</u> .
	:	:	:
" , length	: 6 cm.	: 3 to 5 cm.	: 5 to 6 cm.
	:	:	:
" spots	: large, striate at	: none	: large, grade 6 to 7
	: Riverside (grade 6 $\frac{1}{2}$ )	:	:
	:	:	:
Ovules per locule	: about 8	: 3 or 4	: ± 6

Characters	barbadense (W5)	punctatum	F <sub>1</sub>
Fruiting branches	: ascending-spreading	: spreading-drooping	: ascending-spreading, : mostly transformed : into limbs
Twigs and petioles	: glabrate	: sparsely villous : with long, lax hairs	: very sparsely villous when very young
Leaf-blades, pubescence	: glabrous, or very : sparsely villous on : veins beneath when : young	: similarly pubescent : on margins and veins : beneath	: very sparsely villous on margins and : veins beneath when : young, then : glabrate
" " , lobation	: deeply 5-lobed	: very shallowly : 5-lobed	: rather deeply 5-lobed : (intermediate)
" " , lobes	: oblong-ovate (midlobe) : acuminate & mucronate	: deltoid, more or less : acuminate, often	: deltoid-ovate : (intermediate) : long-acuminate, not : toothed
" " basal lobes	: well-developed on : larger leaves	: often reduced to : coarse teeth	: well-developed
" " basal sinus	: often narrow or closed : above, open 3-angular : below	: rather deep and : narrow	: deep, wide or narrow, : closed near base
Involucel, teeth	: glabrous, or sometimes : sparsely ciliate	: sparsely long- : ciliate	: sparsely long- : ciliate
" bractlets	: lacinate on 2/3 of : margin	: dentate on nearly : the whole margin	: as in punctatum
" " teeth	: 3-angular-lanceolate, : setaceous-acuminate	: lanceolate, : setaceous-acuminate:	: much as in barbadense
Calyx, margin	: shallowly and very : broadly crenulate	: 5-dentate, with : rounded to very : acute teeth	: as in barbadense
Petals, color	: bright yellow	: pale yellow	: very pale yellow
" spots	: large, striate at Riverside, grade 6 $\frac{1}{2}$	: spotless	: spotted, grade 6 $\frac{1}{2}$

Characters	: barbadense (W5)	: punctatum	: F <sub>1</sub>
Filaments	: short, mostly white	: long, pale yellow	: long, white
	:	:	:
Pollen	: bright yellow	: cream-colored	: bright yellow
	:	:	:
Stigmas	: slightly to rather	: slightly exserted	: well-exserted
	: long-exserted	:	:

Characters	: barbadense	: Sturtii	: F <sub>1</sub>
Bark, of twigs	:reddish brown, or : green tinged with red :	:pale green or red- dish brown, glaucous :	:reddish brown or green : tinged therewith, : glaucous
Bark older	:light brown	:light purplish gray	:as in Sturtii
Stipules	:persistent until leaf : nearly full-grown	:caducous :	:intermediate :
" , length	:10 to 20 mm.	:about 7 mm.	:10 to 20 mm.
Petiole	:very stout, mostly : about as long as : blade	:slender, 2/3 as long : as blade :	:rather stout, often : equalling or longer : than blade
Leaf-blades, color	:dark green :	:bluish green, very : glaucous :	:light to dark green, : not or slightly : glaucous
" " lobation	:deeply 5-lobed :	:entire :	:shallowly and broadly : 3-lobed, or rather : deeply and narrowly : 3- to 5-lobed
" " apex	:acuminate and often : long-mucronate	:acutish, cuspidate :	:short- to rather long- : acuminate, cuspidate
" " length	: up to 20 cm.	: up to 8 cm.	: up to 16 cm.
" " basal sinus	:deep, open-triangular : below, narrow or : closed above	: : very short & narrow :	:shallow, usually open : but narrow above :
" " pulvinus	:large, greenish or : brownish	:very small, pinkish : or purplish brown	:small or large, dull : brown or reddish
" " nectary	:large, 2 to 5 mm. long : often on 3 veins :	:lanceolate, near : base midvein :	:large, lanceolate or : deltoid on midvein : only, or all 3 veins
Involucel	:persistent to maturity :	:persistent to : maturity	:persistent until after : anthesis
" bractlets	:nearly separate :	: separate :	: separate :
" " , base	:deeply cordate	: subcordate	: shallowly cordate
	:	:	:

Characters	: barbadense	: Sturtii	: F <sub>1</sub>
Involucel bractlets, dentation	: laciniate on 2/3 of margin, teeth triangular-lanceolate and setaceous	: entire, or very nearly	: laciniate with few or numerous subulate or narrowly lanceolate, setaceous teeth
" " length	: 3.5 to 4.5 cm.	: about 2 cm.	: 3 to 4 cm.
Peduncle, nectaries	: large, but apparently often non-functional, sometimes wanting	: 3, often red	: 1 to 3, small
Calyx, margin	: broadly and very shallowly crenulate	: short-dentate with 3-angular-subulate teeth	: sharply and deeply dentate, with deltoid subulate teeth
" nectaries	: small, transversely elongate (W5 absent (W23, 1055))	: none	: none, or very indefinite
Petals, length	: 6 cm.	: 5 to 6 cm.	: ± 5.5 cm.
" ciliation	: ciliate but not very densely	: densely ciliate near base	: densely ciliate near base
" color	: bright yellow	: pale mauve	: Tyrian pink to rose-color
" spots	: large, striate, grade 6 $\frac{1}{2}$	: long, very asymmetric, deeply feathered	: shorter, broader and more solid than in Sturtii, less deeply feathered
Column, length	: 15 to 22 mm.	: 20 mm.	: 20 to 25 mm.
Filaments & anthers	: Filaments white, anthers whitish or orange	: nearly pansy purple	: purplish or reddish
Pollen	: bright yellow	: cream	: yellow (lighter than in barbadense)
Pistil, length above ovary	: 20 to 30 mm.	: 22 mm.	: 30 to 35 mm.

Characters	: barbádense	: tomentosum	: F <sub>1</sub>
Twigs, petioles, leaf-blades, involucels	: glabrate, or very sparsely villous (leaves only beneath)	: densely whitish tomentose	: grayish tomentose, much more sparsely so in age than in tomentosum
Bark of twigs	: reddish brown or tinged therewith	: green	: green, tinged with reddish brown
Leaf-blades	: dark green	: bluish, then grayish	: rather deep grayish green
" " lobes	: oblong-ovate (midlobe) : acuminate	: ovate or oblong-ovate : short-acuminate	: oblong ovate, rather short-acuminate
" " nectaries	: large, 2 to 5 mm. long : often on 3 veins	: none	: small and indistinct, : on midvein only or one : or both laterals, : sometimes none
Involucel, bractlets	: separate or nearly	: connate only very near base	: separate, or very nearly so
" "	: lacinate on 2/3 of margin	: shallowly dentate on : nearly the whole : margin	: rather shallowly den- : tate on nearly whole : margin
" " teeth	: 3 angular below, : setaceous-acuminate	: short, deltoid- : subulate	: numerous, lance- : subulate, setaceous- : tipped, broad below
" " length	: 35 to 45 mm.	: 25 to 30 mm.	: 45 mm.
" external nectaries	: large, but apparently : often non-functional	: none	: usually 3, hairy, : non-functional?
Calyx, length	: about 8 mm.	: 4 to 5 mm.	: 6 mm.
" nectaries	: small, transversely : elongate, or none	: none	: present, hairy, non- : functional?
Corolla, shape	: funnellform	: very open-campanu- : late	: open-campanulate
" length	: 6 cm.	: 3.5 cm.	: 5 cm.
Petals, color (fresh)	: bright yellow	: brilliant lemon- : yellow	: deeper yellow than : in barbádense
" , " (fading)	: copper-colored	: changing color only : slightly	: copper-colored

Characters	: barbadense	: tomentosum	: F <sub>1</sub>
Petals	: not glossy, slightly ruffled	: glossy, ruffled	: scarcely glossy, slightly ruffled
" , spots	: large, striate, grade 6 $\frac{1}{2}$	: none	: grade 6 or 7
Filaments	: short, mostly white	: long and slender, yellowish	: long and slender, nearly white
Pollen, color	: bright yellow	: cream, then pale yellow	: orange-yellow
Pistil	: rather stout	: very slender	: intermediate
" , exertion	: slightly to rather long-exserted	: long-exserted, exserted portion often = column	: long-exserted, exserted portion about 1/2 as long as column
Stigmas	:	: very short, sometimes separate	: long, coherent

Characters	: contextum	: Armourianum	: F <sub>1</sub>
Vegetative & fruiting :	:	:	:
branches: well-differentiated	: not well-differentiated	: intricately many	: branched, fr. branches
:	: ted	: short, few-flowered,	: spreading
:	:	:	:
:	:	:	:
Twigs and petioles :	: villous	: obscurely puberulent,	: sparsely, very short-
:	:	: soon glabrous	: stellate-pubescent,
:	:	:	: soon glabrous
Fruiting branches :	: elongate, several-	: very short, flowers	: short but well-
:	: flowered	: often single and as	: differentiated,
:	:	: if terminal	: usually 2- to 6-
:	:	:	: flowered
Leaf-blades, pubescence :	: sparsely villous on	: obscurely puberulent,	: like the twigs and
:	: larger veins	: soon glabrous	: petioles
" " :	: thin, not shiny	: thick, shiny on both	: thick and firm, some-
:	:	: faces, especially	: what shiny above
:	:	: above	:
" " , lobation :	: deeply 5-lobed	: entire, rounded	: shallowly 3-lobed
:	:	: deltoid	:
" " , size :	: up to 15 cm. long,	: up to 3.5 cm. long,	: up to 9 cm. long,
:	: 20 cm. wide	: usually wider	: equally or somewhat
:	:	:	: wider
" " pulvinus :	: conspicuous, reddish	: very small, greenish	: small, purplish brown
:	: brown	: or brownish	:
" " basal sinus :	: rather deep, usually	: open, broadly tri-	: very shallow, narrow
:	: open	: angular	: at base
" " nectary :	: nearly circular	: deltoid or lanceolate	: very small but well-
:	:	:	: defined on midvein,
:	:	:	: near base, deltoid
:	:	:	: or nearly circular
Peduncle :	: not articulated	: articulated to	: articulated, soon
:	:	: branchlet	: deciduous
" , external nectaries :	: none, or 1 or 2	: none	: 3, large, deep,
:	:	:	: conspicuous
Involucel :	: persistent	: fugacious	: persistent until
:	:	:	: flower falls
" bractlets :	: slightly connate	: separate	: widely separate, about
:	:	:	: 3 mm. apart at base

Characters	: contextum	: Armourianum	: F <sub>1</sub>
Involucel, bractlets:	5 to 7 long, broad	:	: few, narrowly lanceo-
dentation:	teeth	: entire	: late, setose-tipped
:	:	:	: teeth, as long as
:	:	:	: height of undivided
:	:	:	: portion
" , bractlets, shape:	broadly ovate, deeply	: subulate or narrowly	: oblong, somewhat
:	cordate	: lanceolate	: narrowed at base
:	:	:	: but not clawed
Calyx, nectaries	: apparently present,	:	: present, but not
:	but poorly defined &	: None	: well-defined
:	perhaps non-functional	:	:
Corolla, shape	: open-campanulate	: very open-campanulate	: open-campanulate
" , length	: 45 to 60 mm.	: 25 to 45 mm.	: 40 to 45 mm.
Petals, color	: nearly white	: pale green-yellow	: very pale-yellow,
:	:	:	: (lighter than Martius)
:	:	:	: yellow) fading deep
:	:	:	: rose.
Petals, spots	: none	: present or absent	: large, rather intense,
:	:	:	: grade 8 or 9
Pollen, color	: nearly colorless	: apricot yellow	: light cadmium
Pistil, length	:	:	:
above ovary:	25 to 35 mm.	: 20 to 25 mm.	: ± 30 mm.
Pistil, exerted	: about 2/3 as long as	: shorter to longer	: equalling, or longer
portion:	column	: than column	: than column
Filaments, color	: white	: whitish or purplish	: lower ones, or some-
:	:	:	: times all, purple
Anthers, connective	: deep cream	: carmine or dark	: reddish
:	:	: purple	:

Characters	Davidsonii	anomalum	F <sub>1</sub>
Twigs, petioles & leaf-blades	: densely soft-pubescent : : with short, stellate : : hairs	: villous with long, : : spreading hairs, : : also short-stellate:	: as in Davidsonii but : : hairs somewhat longer
Leaf-blades, color	: light green, at first : : yellowish	: light yellowish : : green	: yellowish green at : : first, then deeper : : (grayish) green than : : in either parent
Leaf-blades (larger)	: entire or coarsely : : 1- to 2-toothed	: deeply 5-lobed with : : oblong-ovate, acute : : lobes	: deeply 5-lobed with : : broadly ovate or : : oblong-ovate, short- : : acuminate lobes
" " , basal sinus	: almost none, blades : : usually truncate at : : base	: deep and narrow, but : : open	: rather shallow, open : : triangular, or : : almost none
" " , pulvinus	: reddish brown	: greenish	: greenish or reddish : : brown
" " , nectaries	: on midvein near base : : : : : : :	: well above base on : : 3-principal veins : : : : :	: small but conspicuous, : : deltoid or elliptic : : about 15 mm. above : : base of midvein and : : often on 2 laterals
Involucel, bractlets, shape	: oblong-ovate to : : broadly ovate	: narrowly lanceolate	: oblong ovate, somewhat : : narrowed at base, : : somewhat spreading
" " length:	25 to 35 mm.	up to 15 mm.	30 to 35 mm.
" " margin:	: lacinate with 8 to : : 10 lanceolate- : : setaceous teeth	: almost entire, or : : shallowly 3-toothed : : near apex	: deeply lacinate (more : : than 1/2-way) with 5 : : or more lanceolate- : : setaceous teeth
" external nectaries:	: small, inconspicuous	: large, rectangular	: small, but well-defined, : : transversely rectangu- : : lar to nearly circular
Calyx margin	: entire or undulate	: deeply cleft, with : : long, deltoid- : : subulate teeth	: rather deeply dentate : : teeth as in anomalum, : : or very broad, shallow, : : rounded
Calyx surface	: many-ribbed, the ribs : : short, somewhat : : prominent	: strongly many-ribbed	: ribbed as in anomalum : : but ribs somewhat less : : prominent
Petals	: pale greenish yellow	: lavender pink	: cream-colored, with : : purplish tinge : : externally

Characters	: Davidsonii	: anomalum	: F <sub>1</sub>
Pollen	: pale yellow	: cream	: cream
Pistil, color	:pale green, dotted with: : darker green oil- : glands	: : :	:white, with dark-brown : (nearly black) oil- : glands
Petal spots	:conspicuous, usually : solid, 5 to 7 mm. long: : :	: broad, about 12 mm: : long, intense, : feathered on : margin	:very large, intense, : Sturtii-like, 13 to : 15 mm. long :

Characters	Davidsonii	Sturtii	F <sub>1</sub>
Twigs, petioles, leaf-blades, etc.	densely soft pubescent with short stellate hairs	glabrous	glabrous except obscurely puberulent on petiole, pulvinus and bases of leaf veins
Twigs & leaf-blades	not glaucous	glaucous	glaucous, but much less than in Sturtii
Leaf-blades, texture	soft and rather thin	thickish, firm	much as in Sturtii
" " color	yellowish green, not glaucous	bluish, very glaucous	bluish green, slightly glaucous
" " " "	inconspicuously and not prominently punctate	black-punctate	punctate as in Sturtii
" " margin	entire or 1-2-toothed	entire	entire, or rarely with a short tooth
" " length	5 to 12 cm.	up to 8 cm.	up to 8 cm.
" " apex	short- to long-acuminate	acutish, cuspidate	short-acuminate and short cuspidate
" " basal sinus	open or none	very short and narrow	as in Sturtii
" " pulvinus	reddish brown	pinkish	very small, dull brown
Involucel, bractlets, length:	25 to 35 mm.	20 mm.	about 25 mm.
" " margin:	deeply lacinate with 8 to 10 lanceolate-late-setaceous teeth	entire or <sup>very</sup> nearly so	dentate with few, short deltoid-lanceolate, setose-tipped teeth
Calyx, length	4 to 6 mm.	6 mm.	5 to 6 mm.
" margin	entire or undulate	dentate with 3 angular-subulate teeth	dentate, with deltoid, acute or setose-acuminate teeth
Petals, length	3 to 4.5 cm.	5 to 6 cm.	3.5 to 4 cm.
" , color	pale greenish yellow	pale mauve	pale rhodonite-pink
" spots, length	5 to 7 mm.	about 15 mm.	+ 16 mm.
" " " "	not (?) strongly rotate, usually <sup>solid</sup>	strongly rotate, deeply feathered	as in Sturtii
Column, length	12 mm.	20 mm.	16 to 18 mm.

Characters	: Davidsonii	: Sturtii	: F <sub>1</sub>
Column	:stamiferous on : upper half	:stamiferous nearly : to base	: as in Sturtii :
Filaments, length	: 2 to 3 mm.	: 1.5 to 2 mm.	: about 2 mm.
" , color	: pale yellow	: pansy-purple	: deep pink
Anthers, color	: cream	: " "	: cream, bordered with : pink
Pollen, "	: pale yellow	: cream	: very pale yellow
Pistil, "	:pale green, with : deeper green oil- : glands*	:white, with black : oil-glands	: white, oil-glands : very few, dark brown
Stigmas	:often somewhat separ- : ate and slightly : recurved	:closely coherent, : erect	: as in Sturtii :

\* In 1937, at Palm Springs, white, without conspicuous oil-glands.

Characters	Harknessii	Armourianum	F <sub>1</sub> (W 41)
Twigs, petioles, etc.	: densely puberulent with: : very short, stellate : hairs	: obscurely granular- : puberulent, soon : glabrous	: like Armourianum
Older bark	: brownish-gray	: light reddish brown	: light brown
Stipules, length	: 3 to 6 mm.	: 1.5 to 2.5 mm.	: as in Armourianum
Leaf-blades, color	: yellowish green	: dark green or yel- : lowish green	: light green, some- : times yellowish
" " , surface	: not or but very alight- : ly shiny	: shiny on both faces	: less shiny than in : Armourianum, about : as in Harknessii
" " , length	: 3 to 6 cm.	: 2 to 3.5 cm.	: up to 3.5 cm.
" " , shape	: broadly deltoid	: rounded deltoid	: reniform or broadly : ovate
" " , apex	: short-acuminate, or : acutish and mucronate	: obtuse or acutish : and often mucronate	: obtuse (mostly) or : acutish, not : mucronate
" " , base	: deeply cordate	: subcordate, or very : shallowly cordate	: deeply cordate
" " , lobation	: shallowly 3-lobed	: entire	: nearly entire or very : shallowly 5-lobed : with rounded lobes, : less deeply than in : Harknessii.
Peduncle at anthesis	: subclavate, : 5 to 12 mm. long	: subclavate, : 20 to 40 mm. long	: broadly clavate, : 15 to 20 mm. long
" , nectaries	: none	: none	: 3, large, inverted- : delta-shaped
Involucel	: persistent until or : near anthesis	: deciduous long : before anthesis	: slightly more per- : sistent than in : Armourianum, until : flower bud is ± 8 mm. : long
" , bractlets, width	: 7 to 15 mm.	: less than 1 mm.	: 4 to 5 mm.
" " length	: 10 to 25 mm.	: 2 to 5 mm.	: 10 to 12 mm.
" " shape	: narrowly ovate or : oblong-ovate	: subulate or narrowly : lanceolate	: lanceolate or ovate- : lanceolate, acute
" " margin	: entire, denticulate or : few-dentate towards : apex	: entire	: entire or very shal- : lowly 1- or 2-dentate

Characters	Harknessii	Armourianum	F <sub>1</sub> (W 41)
Calyx, margin	: undulate or denticulate : late : :	: 5-dentate with : triangular or sub- : undulate teeth : :	: conspicuously but : shallowly dentate : with broadly deltoid, : acute teeth
" nectaries	: none? : :	: none : :	: none definite, but : possibly some nectariferous tissue : at base of calyx
" oil-glands	: rather large, fairly : numerous	: large, numerous : :	: small, numerous, : brownish
Petal spots	: none :	: present or absent :	: small but conspicuous, : grade 6 to 8

Characters	Harknessii	Thurberi	F <sub>1</sub>
Twigs and petioles	:terete or nearly so	: quadrangular	:rounded-quadrangular
" pubescence	:densely stellate- : puberulent	: soon glabrous :	:densely, minutely : puberulent
Leaf-blades, texture	: thickish	: thin	:thin but firm
" " color	: yellowish green	: bright green	:light grayish green
" " margins	:obscurely puberulent	: ciliolate	:obscurely puberulent
" " lobation	:shallowly 3-lobed : :	: pedately 3 to 5- : parted :	:3 (occasionally 5- : lobed) much less : deeply than in : Thurberi
" " apex	:short-acuminate, or : acutish and mucronate	: long-acuminate :	:long-acuminate :
" " base	:deeply cordate :	: subcordate or : cordate	:rather deeply cordate :
" " lobes	:broadly deltoid :	: lance-elliptic or : lanceolate	:lanceolate or ovate- : lanceolate
" " length	: 3 to 6 cm.	: up to 15 cm.	: up to 11 cm.
" " nectary	:minute (less than 1 mm. : long) on midvein some : distance from base	:triangular or ellip- : tic, lanceolate, : 1 to 4 mm. long	:deltoid or elliptic : 1 to 1.5 mm. long :
Peduncle	:subclavate, 5 to 12 mm. : long :	:clavate at apex, 10 : to 20 (sometimes : 30) mm. long	:strongly clavate at : apex, 20 to 40 mm. : long
"	:angular and furrowed :	: angular and furrowed :	:strongly angled, not : noticeably furrowed
Involucrel	:persistent to anthesis, : or nearly : :	: persistent to : maturity : :	:deciduous before : anthesis or per- : sistent until boll : is well-developed
" bractlets, length:	10 to 25 mm.	: 7 to 15 mm.	: 15 to 20 mm.
" " width:	7 to 15 mm.	: 2.5 to 5 mm.	: 8 to 9 mm.
" " margin:	entire to few-dentate :	: entire to denticu- : late	:rather deeply 2 or : 3-toothed
" " shape	:narrowly ovate or : oblong-ovate	: lanceolate	:ovate-lanceolate

Characters	Harknessii	Thurberi	F <sub>1</sub>
Involucel, nectaries	none	2 or 3, often large	3, large and deep
Calyx, length at anthesis	6 to 8 mm.	about 4 mm.	5 to 7 mm.
" oil-glands	few, greenish, inconspicuous	very numerous, small	numerous, very small, yellowish or brown
" margin	undulate or denticulate	undulate, sometimes few-dentate	undulate, or very short-dentate
" nectaries	none?	none	none, or indefinite
Corolla, shape	very open-campanulate	rather shallowly cup-shaped	cup-shaped, very open and shallow
Petals, length	30 to 50 mm.	25 to 30 mm.	30 to 35 mm.
" color	light green yellow	white	pale yellow
" spot	none	none or faint	none
Anthers, connective	bordered with red or sometimes not	bordered with dull orange	bordered with pale or reddish, brown
Pollen, color	yellow	cream	cream or pale yellow
Pistil, color	white, with pale-brown oil-glands	pale green, with deeper green oil-glands	nearly white, with yellowish oil-glands

Characters	: herbaceum (743)	: neglectum (785)	: F <sub>1</sub>
Vegetative branches	: ascending-spreading :	: widely ascending : or spreading	: ascending-spreading :
Fruiting branches	: short, spreading :	: rather long, spread- : ing or slightly : drooping	: rather long, : ascending-spreading :
Twigs and petioles	: puberulent to rather : densely short- : pubescent and sparsely : villous	: sparsely short- : pubescent and : densely villous :	: villous, more so than : in herbaceum, less : than in neglectum, : also short-stellate
Leaf-blades, color	: deep green, tinged : with bronze	: dark grayish green :	: grayish green :
" " lobation	: shallowly 5-lobed	: 5-parted	: deeply 5-lobed
" " lobes	: very broadly ovate, : rounded	: oblong-lanceolate :	: oblong-lanceolate : or ovate-oblong
" " apex	: obtuse, often micro- : nate	: acuminate, often : bluntly so	: short-acuminate, often : bluntly, and mucronate
" "	: more or less cupped : near base	: strongly cupped : near base	: strongly cupped near : base
" " midlobe	: 35 to 45 mm. wide	: 20 mm. wide	: 20 to 35 mm. wide
" " "	: somewhat constricted : at base : :	: not constricted at : base : :	: slightly constricted at : or above base, in : latter case slightly : cleft
" " basal lobes	: sometimes slightly : cleft	: often deeply cleft :	: often cleft, sometimes : deeply
" " (larger)	: 9 cm. long, 11 to : 13 cm. wide	: 9.5 cm. long, : 10.5 cm. wide	: 12 cm. long, 13 cm. : wide
" " nectary	: near base of midvein, : minute (less than : 1 mm.) but conspicu- : ous	: none :	: none, or very small, : nearly circular, : near base midvein :
Peduncle, before anthesis	: erect or spreading : or slightly declined	: erect or ascending :	: erect or ascending :
" , in fruit	: usually deflexed :	: often decurved soon : after anthesis	: often decurved :
Involucel, color	: purplish	: green	: purplish
" , bractlets	: strongly connate	: often strongly : connate	: connate near base

Characters	: herbaceum (743)	: neglectum (785)	: F <sub>1</sub>
Involucrel, bractlets, shape	: broadly deltoid-ovate	: deltoid, narrower than in herbaceum	: triangular-ovate, intermediate in width
" " margin	: dentate on nearly whole margin, teeth rather long, triangular-setaceous	: teeth subulate, few, very short, mostly 1-2 mm.	: teeth few, mostly near apex, up to 4 mm. long, deltoid-setaceous
" " nectaries	: none, or well-developed, but apparently non-functional	: none, or very rudimentary	: none, or rudimentary
Calyx margin	: shallowly crenate with very broad, rounded teeth	: sharply short-dentate dentate	: very short-dentate, teeth deltoid, not setose-tipped
" " nectaries	: 1 to 3 very large, inverted, delta-shaped, few, rather large, black	: none or rudimentary	: very large, inverted delta-shaped, sometimes pubescent and apparently non-functional
" " oil-glands	: few, rather large, black	: rather numerous, large, black	: as in neglectum
Corolla, length	: 3 to 4 cm.	: about 4.5 cm.	: about 4 cm.
Petals	: ruffled at apex	: slightly ruffled	: conspicuously ruffled
" " color	: near Martius yellow	: pale greenish yellow	: between Martius and pieris yellow

Characters	herbaceum	Sturtii	F <sub>1</sub>
Twigs and petioles	:puberulent to rather : densely short pubes- : cent and sparsely : villous	: : glabrous : :	:glabrous, or very : nearly : :
Twigs, bark	:green, reddish brown, : finally very dark : brown, not glaucous	:pale green or red- : dish, glaucous : :	:green or reddish, : slightly glaucous : :
Leaf-blades, pubescence	:pubescent on both : faces	: : glabrous : :	: soon glabrous : : :
" " color	:deep green, tinged : with bronze, not : glaucous	:bluish (very : glaucous) : :	:slightly glaucous, : deep green, or tinged : with purplish : :
" " lobation	:shallowly 5-lobed, : midlobe broadly ovate, : rounded	: : entire : :	:entire to shallowly : 5-lobed, midlobe broadly : deltoid : :
" " apex	:obtuse, often : mucronate	:acutish, cuspidate : :	: acute or acutish, : cuspidate : :
" " basal sinus	:shallow, open, broadly : triangular or narrow : above	: very short and : narrow : :	: short and narrow, but : open : :
" " pulvinus	:small, reddish brown :	:very small, pinkish : :	: very small, light brown : or purplish : :
" " nectary	:near base of midvein, : minute (less than 1 mm) : but conspicuous.	: elongate, lan- : ceolate : :	:near base of midvein : only, very small but : well-defined : :
Peduncle, before anthesis	:20 to 30 mm. long, : erect to slightly : declined	:about 12 mm. long, : strongly ascend- : ing : :	:about 12 mm. long, : ascending : :
Involucel, bractlets	: strongly connate :	: separate : :	:separate, but approximate : at base : :
" " , length:	20 to 30 mm.	: ± 20 mm.	: 15 to 25 mm.
" " margin	:dentate on nearly : whole margin, teeth : rather long, triangu- : lar-setaceous	:entire or very : nearly so : :	:rather deeply laciniate : or shallowly dentate, : with several slender : teeth near apex. : :

Characters	:	herbaceum	:	Sturtii	:	F <sub>1</sub>
Involucrel, bractlets, pubescence	:	copiously short-stellate-pubescent	:	glabrous	:	very sparsely puberulent and ciliolate
" bractlets, color:	:	purplish	:	pale green or slightly purplish	:	purplish brown
Calyx, oil-glands	:	few, rather large, black	:	numerous, prominent, black	:	rather few, small
" nectaries	:	1 to 3, very large, inverted delta-shaped:	:	none	:	none
Corolla, length	:	about 3 cm.	:	5 to 6 cm.	:	4 to 5 cm.
Petals	:	ruffled at apex	:	not ruffled	:	slightly ruffled
" color	:	near Martius yellow	:	pale mauve	:	deep rose-pink
" spots	:	solid	:	deeply feathered	:	broader than in Sturtii but similarly feathered
Pollen, color	:	empire yellow	:	cream	:	pale yellow, or cream (different plants)
Column, length	:	± 15 mm.	:	20 mm.	:	20 mm.
Filaments, lower, length	:	about 2 mm.	:	1.5 to 2 mm.	:	about 3 mm.
" color	:	white (sometimes purplish?)	:	purple	:	purple
Stigmas	:	not, to considerably, exerted	:	greatly exerted	:	short, short-exserted

Characters	: hirsutum (W24)	: Armourianum	: F <sub>1</sub>
Twigs, petioles and veins of lower leaf-surface	: sparsely villous : with rather long, : simple or branched : hairs	: obscurely puberulent, : soon glabrous	: stellate-puberulent, : glabrate
Bark of twigs	: reddish-brown, not : glaucous	: reddish and more or : less glaucous	: reddish-brown, glaucous
Older bark	: light brown	: light reddish brown	: light brown
All parts	: glandular-punctate :(leaf-blades rather : obscurely) with : black oil-glands	: glandular-punctate : with brown oil-glands	: glandular-punctate, : with dark oil-glands
Stipules	: persistent, 10 to : 15 mm. long	: caducous, 1.5 to : 2.5 mm. long	: rather persistent, 7 : to 10 mm. long
Petioles	: stout, equalling to : much longer than : blades	: slender, equalling or : slightly longer than : blades	: intermediate in size, : equalling or longer than : blades
Leaf-blades, lobation	: rather deeply : 5-lobed	: entire	: entire or shallowly : 3-lobed with deltoid : lobes
" " , texture	: thickish, rather : firm	: thick and firm	: thick and firm
" " , color	: bright green	: dark or yellowish : green	: rather deep green, : somewhat glaucous
" " , surface	: not shiny	: shiny on both faces	: shiny only when very : young
" " , base	: deeply cordate, : sinus often narrow	: subcordate, or very : shallowly cordate	: rather deeply cordate, : sinus broad, narrow : at base
" " , apex	: abruptly acuminate	: obtuse or acutish and : often mucronate	: acute or very short- : acuminate, mucronate
" " , pulvinus	: large, reddish brown	: very small, greenish : or brownish	: small, reddish brown
" " length	: up to 10 cm.	: 2 to 3.5 cm.	: up to 8 cm.
Fruiting branches	: long, several- : flowered, spreading	: very short, mostly : 1-flowered, peduncle : appearing terminal : and articulated	: short or long, 2 to : 7-flowered, spreading

Characters	: hirsutum (W84)	: Armourianum	: F <sub>1</sub>
Involucel	: persistent	: deciduous long before anthesis	: persistent, at least until anthesis
" bractlets	: slightly connate at base	: separate	: separate, widely
" ,length:	4.5 to 5 cm.	2 to 5 mm.	2.5 cm.
" , shape:	: broadly deltoid-ovate: deeply cordate, deeply laciniate : with numerous, long : teeth	: subulate or narrowly lanceolate, entire	: deeply lacinate with 3 to 7 long, lance-subulate, setose-tipped teeth
" nectaries	: 2 (or 3 ?) deep, nearly circular	: none	: 3, very deep, inverted delta-shaped or nearly circular
Calyx at anthesis	: 12 mm. long, deeply dentate with broad-deltoid, acute teeth	: 5 to 10 mm. long, dentate, teeth 3-angular or subulate, 1 to 2 mm. long	: 11 mm. long, abruptly dentate with subulate teeth
" oil-glands	: rather numerous, small, black	: numerous	: many, very small, black
" nectaries	: none, or indefinite	: none	: indefinite
Corolla, length	: 4 cm. (not full size)	2.5 to 4.5 cm.	4 to 4.5 cm.
Petals	: rather densely ciliate near base	: densely ciliate near base	: densely ciliate near base
" , color	: nearly white	: pale green-yellow	: pale green-yellow
" , spot	: none	: none to pronounced	: present, faint or intense, or often none
Anthers, connective	: deep cream	: bordered with red or dark purple	: with or without red border
Pollen, color	: cream	: near apricot yellow	: light cadmium
Stigmas	: scarcely exerted	: very long-exserted	: very long-exserted, ↗
Ovules, per locule	: ± 10	: usually 3	: exerted portion = or longer than column

↘ about 7

Characters	: hirsutum (W 64) <sup>1/</sup>	: cernuum (W 15)	: F <sub>1</sub>
Fruiting branches	: long, ascending- : spreading	: spreading or mostly : drooping	: numerous, nearly hori- : zontal, 4 or 5- : flowered
Bark of twigs	: dark brown-purple	: reddish brown	: dark brown, becoming : nearly black
Twigs and petioles	: copiously long-villous; : with branched and : simple hairs	: densely stellate- : puberulent and sparse- : ly villous	: densely villous
Leaf-blades, color	: bronze-purple	: rather dark grayish : green	: dark bronze green, with : reddish brown veins
" " , lobation	: shallowly 3 to 5-lobed; : when 5-lobed basal : ones mere teeth	: deeply and narrowly : 5-lobed	: deeply 5-lobed
" " pubescence	: villous on veins	: short-stellate both : faces, villous on : veins beneath	: copiously short- : stellate both faces : and long villous on : veins beneath
" " lobes	: broadly deltoid-ovate	: oblong-lanceolate	: oblong-ovate
" " apex	: somewhat abruptly : long-acuminate	: acute or short- : acuminate	: long- and sharply : acuminate
" " midlobe	: not constricted	: scarcely to distinctly : constricted at base	: not, or slightly : constricted at base
" " upper sinuses	: very open, rounded at : base	: very open, rounded or : truncate at base	: narrow, rounded or : acutish at base
" " basal sinus	: deep, narrowly to : broadly 3 angular	: shallow, open 3- : angular or almost : none	: deep and narrow, but : usually open
" " (larger) length	: 10 cm.	: 8.5 cm.	: 10 cm.
" " " width	: 14 cm.	: 11 cm.	: 11 cm.
" " pulvinus	: large, liver-colored	: very small, brownish : or dull reddish brown	: large, reddish brown
" " nectaries	: on midvein only, 1.5 : mm. long, sharply de- : fined, deltoid	: often 3, small but : prominent, rounded, : 3-angular or elliptic	: small, but sharply : defined, usually on : midvein only

<sup>1/</sup> W 64 is Red Acala.

Characters	: hirsutum (W 64)	: cernuum (W 15)	: F <sub>1</sub>
Peduncle	: about 1.5 cm. long, : erect :	: 2.5 cm. long, : sharply declined : even at anthesis	: 8-15 mm. long, erect : or ascending
Flower	: not pendent	: pendent	: erect or ascending (?)
Involucel, pubescence:	: stellate-pubescent on: : veins, teeth long- : ciliate	: stellate-puberulent: :	: sparsely stellate, : teeth ciliate
" , color	: mahogany :	: green tinged with : brown-purple	: reddish brown
" , bractlets	: connate near base	: strongly connate	: rather strongly connate
" " length	: about 4 cm.	: 3.5 cm.	: about 4 cm.
" " teeth	: numerous, long, lan- : ceolate, setaceous- : acuminate	: none, or 2 near : apex about 1 mm. : long	: rather deeply lacinate : with several deltoid- : lanceolate, setaceous- : acuminate teeth
" nectaries	: mostly 2, large, : transversely elon- : gate	: none :	: none, or rudimentary
Calyx margin	: deeply dentate with : deltoid teeth :	: entire or undulate :	: shallowly dentate, with : broad-deltoid, scutish : teeth
" nectaries	: indefinite :	: none, or very : rudimentary	: 1 or 2, small, very : sharply defined
Corolla, length	: 4.5 cm.	: 3.5 cm.	: 4 cm.
" , petals	: not ruffled, slightly: : arose	: ruffled at apex :	: slightly ruffled
" " color	: nearly white, rose : where exposed	: nearly white :	: pale yellow, rose : where exposed
" " spots	: none :	: very large, solid :	: fairly large and intense : grade 6-7
Filaments, color	: purplish	: purplish	: white
Pollen, color	: cream	: light cadmium	: orange-yellow
Stigmas	: short but well- : exerted	: not surpassing : stamens	: short but well- : exerted

Characters	: hirsutum (W 24)	: Sturtii	: F <sub>1</sub> (W 139)
Fruiting branches	: long, several-flowered, spreading	: short, nearly erect, 1 or 2-flowered	: nearly horizontal, or somewhat ascending, rather long, up to 6-flowered
Bark of twigs	: reddish brown, not glaucous	: reddish brown or pale green, glaucous	: reddish, somewhat glaucous
Stipules	: persistent, 10 to 15 mm. long	: caducous, about 7 mm. long	: somewhat caducous, 9 to 12 mm. long
Pubescence	: sparsely villous, with rather long, simple or branched hairs	: none (plant glabrous)	: very sparsely short-stellate, glabrate
Petiole	: stout, equalling or much longer than blade	: slender, 2/3 as long as blade	: rather stout, about equalling blade
Leaf-blades, color	: bright green, not glaucous	: bluish green, very glaucous	: deep green, slightly glaucous
" " , texture	: thickish, rather firm	: thickish, firm	: thickish, firm
" " , lobation	: rather deeply 5-lobed	: entire	: entire to shallowly 3-lobed, lobes deltoid
" " , apex	: abruptly acuminate	: acutish, cuspidate	: short-acuminate, cuspidate
" " , length	: up to 10 cm.	: up to 8 cm.	: up to 10 cm.
" " basal sinus	: deep, often narrow	: very short and narrow	: shallow, narrow near base
" " pulvinus	: large, reddish brown	: very small, often pinkish	: rather large, reddish brown
" " nectary	: small but well-defined, especially on midvein	: elongate, lanceolate, near base midvein	: 1 to 2 mm. long, triangular or elliptic
Involucel, length	: 4.5 to 5 cm.	: about 2 cm.	: 3.5 cm.
" " , bractlets	: slightly connate at base	: separate	: separate
" " margin	: deeply lacinate, with numerous, long teeth	: entire or very nearly	: deeply lacinate, with few, lance-subulate, setaceous teeth
" " base	: deeply cordate	: subcordate	: rather deeply cordate

Characters	: hirsutum (W 24)	: Sturtii	: F <sub>1</sub> (W 139)
Peduncle, nectaries	: 2 (or 3 ?) deep, : nearly circular	: 3, often red	: 3, small but deep and : sharply defined, : transversely elongate
Calyx, "	: none, or indefinite	: none	: none
Petals, length	: 4 cm. (not full size)	: 5 to 6 cm.	: ± 5 cm.
" , ciliation	: rather densely cili- : ate near base	: densely ciliate near : base	: densely ciliate near : base
" , color	: nearly white	: pale mauve	: near Tyrian pink
" , spots	: none	: very asymmetric, : deeply feathered	: large, intense, feathered : as in Sturtii
Column, length	: 10 to 15 mm.	: 20 mm.	: 20 mm.
Filaments, length	: about 3 mm.	: 1.5 to 2 mm.	: 3 to 4 mm.
" & anthers, color	: white and deep cream	: near pansy purple	: purple
Pistil length (above ovary):	: 10 to 14 mm.	: 22 mm.	: 25 mm.

Characters	: hirsutum (W 24)	: Thurberi	: F <sub>1</sub> (W 37)
Plant	: glandular-punctate : (leaf-blades rather : obscurely) with dark : glands	: dotted with slight- ly prominent oil- glands	: dotted with black oil- glands, these not : prominent
" pubescence	: sparsely villous with: : rather long, simple : and branched hairs	: glabrous (soon) ex- cept the ciliolate : leaf-margins and : puberulent veins	: glabrate (sparsely stel- late puberulent on young : parts).
Fruiting branches	: long, several- : flowered, spreading	: short, ascending, : usually forked, : several-flowered	: ascending, or nearly : horizontal
Twigs	: rounded-quadrangular	: quadrangular	: rather sharply quad- : rangular
" bark	: reddish brown	: reddish brown, or : tinged therewith	: reddish brown
Stipules	: 10 to 15 mm. long, : persistent	: 6 to 7 mm. long, : extremely fugacious:	: 9 to 14 mm. long, : soon deciduous
Petioles	: stout, rounded- : quadrangular	: rather slender, : quadrangular	: rather slender, rounded- : quadrangular
Leaf-blades, length	: up to 10 cm.	: up to 15 cm.	: up to 15 cm.
" " lobation	: rather deeply 5-lobed:	: pedately 3-parted, : some 5-parted	: deeply 3- to 5-lobed
" " lobes	: broadly ovate-deltoid:	: lance-elliptic or : lanceolate	: oblong-ovate
" " apex	: abruptly acuminate	: attenuate acuminate:	: long and sharply : acuminate
" " base	: deeply cordate, basal: : sinus often narrow	: subcordate or : cordate	: deeply cordate, basal : sinus narrow or closed
" " pulvinus	: large, reddish brown:	: small, greenish or : brownish	: rather large, dull-brown
" " nectary	: small but well-de- : fined, especially on : midvein	: 1 to 4 mm. long, on: : midvein, triangular : or elliptic	: on midvein only, 1 to 2 : mm. long, triangular, : conspicuous
Peduncle	: 1 to 2 cm. long, : rounded-angular, : slightly furrowed	: 2 to 3 cm. long, : angular, furrowed	: 3 to 4 cm. long, angular, : somewhat furrowed
" nectaries	: 2 (or 3 ?) deep, : nearly circular	: 2 or 3, often large:	: 3, large and deep

Characters	: hirsutum (W 24)	: Thurberi	: F <sub>1</sub> (W 37)
Involucrel	: persistent to maturity, erect at anthesis	: persistent to maturity, spreading at anthesis	: persistent, not spreading
" bractlets, length	: 45 to 50 mm.	: 7 to 15 mm.	: 30 mm.
" " "	: slightly connate at base	: separate	: separate
" " shape	: broadly deltoid-ovate: deeply cordate	: lanceolate	: cordate-ovate
" " margin	: deeply lacinate, with numerous, long teeth	: entire or with 2 or 3 very short, sub-late teeth	: very deeply lacinate with numerous lanceolate setaceous-acuminate teeth
Calyx length at anthesis	: 12 mm.	: ± 4 mm.	: 7 mm.
" nectaries	: none or indefinite	: none	: present, rather indefinite
" margin	: deeply dentate with broadly deltoid, acute teeth	: usually entire or undulate	: shallowly and broadly crenate-dentate
Corolla, shape	:	: rather shallowly cup-shaped	: open-campanulate
" , length	: 40 (or more) mm.	: 25 to 30 mm.	: ± 40 mm.
" , petals	: rather densely ciliate: at base	: densely ciliate on claws	: densely long-ciliate on claws
" " spot	: none	: faint, striate, or none	: none
Pistil (length above ovary):	: 10 to 14 mm.	: about 18 mm.	: 22 mm.
" exerted portion	: 5 mm. long, or less	: about 1/2 as long as column	: about 2/3 as long as column
" color	: cream with dark brown oil-glands	: pale green with deeper green oil-glands	: nearly white, with nearly black oil-glands

Characters	: hirsutum (W 64) <sup>1/</sup>	: tomentosum	: F <sub>1</sub> (W 80)
Twigs, petioles, leaf-blades and involuclals	: copiously long-villous : with branched or : simple hairs	: densely whitish : tomentose	: grayish tomentose, hairs : longer than in tomento- : sum
Bark, twigs	: dark red-brown, be- : coming nearly black	: green	: dark reddish brown :
Leaf-blades, color	: bronze-purple :	: bluish, then grayish :	: grayish green, tinged : with red
" " , lobes	: broadly deltoid-ovate, : somewhat abruptly : long-acuminate	: ovate or oblong-ovate, : short-acuminate	: oblong-ovate, acuminate :
" " , nectaries	: on midvein only, : small, sharply : defined	: none	: near base of midvein : only, very small to : rather conspicuous
Involuclal, length	: ± 40 mm.	: 25 to 30 mm.	: 35 to 37 mm.
" , bractlets	: connate near base :	: connate only very near: : base	: separate or very : slightly connate
" " margin	: deeply laciniate, : teeth numerous, long, : lanceolate, : setaceous-acuminate	: shallowly dentate on : nearly whole margin, : teeth short, deltoid- : subulate	: rather deeply laciniate : with numerous long, : deltoid-lanceolate, : setaceous teeth
" external nectaries	: 2 or 3, large, nearly: : circular or trans- : versely elongate	: none	: mostly rudimentary, : sometimes well-defined :
Calyx, length	: 11 mm.	: 4 to 5 mm.	: about 7 mm.
" , margin	: deeply dentate, with : deltoid, acute or : acutish teeth	: entire	: undulate or very shal- : lowly crenate, teeth : broadly deltoid, obtuse
" , nectaries	: indefinite	: none	: none, to well-developed
Corolla, shape	: funnelform-campanulate	: very open-campanulate	: funnelform-campanulate
" , length	: 4 to 4.5 cm.	: 3.5 cm.	: 4.5 to 5 cm.
Petals, color(fresh)	: nearly white, rose- : colored where exposed	: brilliant lemon- : yellow	: light yellow (paler than : in tomentosum)
" " (faded)	: deep rose	: changing color only : slightly	: deep rose :
"	: not glossy, not ruffled, : slightly erose	: glossy, ruffled	: not glossy, scarcely : ruffled

<sup>1/</sup> W 64 is Red Acala.

Characters	: hirsutum (W64)	: tomentosum	: F <sub>1</sub> (W 80)
Filaments	:: slender, about 3 mm. : long	: long, slender, about: : 4 mm. long	: very slender, up to : 7 mm. long
" color	: white	: yellowish	: ochroleucous
Pollen, color	: cream	: cream, then pale- : yellow	: pale yellow
Pistil	: stout	: very slender	: slender
" , exertion	: short-exserted, not surpassing upper : stamens	: long-exserted, : exerted portion : often = column	: exerted portion = or : longer than column
Stigmas	: about 4 mm. long, : coherent	: very short, some- : times separate	: elongate, coherent

Characters	: Nanking (824)	: Thurberi	: F <sub>1</sub>
Fruiting branches	: long, slender, : spreading or slight- : ly drooping	: short, ascending, : usually forked, : several-flowered	: of intermediate length, : spreading or drooping :
Bark of twigs	: brown, becoming : nearly black	: reddish brown or : tinged therewith	: brown, becoming nearly : black
Branchlets & petioles	: densely cinereous- : puberulent and long- : villous	: soon glabrous	: very sparsely and very : short-stellate puberu- : lent, no long hairs
Plant	: inconspicuously : dark-punctate	: dotted with slightly : prominent oil-glands	: very obscurely dark : punctate
Twigs and petioles	: terete or nearly so : :	: quadrangular : :	: rounded 3-angular or : quadrangular, petioles : often somewhat com- : pressed
Leaf-blades, pubescence	: short-ciliate, sparse- : ly very short stel- : late pubescent and : sparsely villous on : veins beneath, with : mostly simple hairs : becoming glabrate : above	: margins ciliate, : veins puberulent	: puberulent like twigs, : then glabrate : : : :
" " color	: deep green above with : pinkish veins, veins: : dark red beneath	: bright green	: dark green, veins : pinkish above, reddish : brown below
Stipules	: 8 to 10 mm. long, : lanceolate, persist- : ent	: 6 to 7 mm. long, : subulate, extremely : fugacious	: 6 to 7 mm. long, lance- : subulate, fugacious, : but less so than in : Thurberi
Petioles	: becoming deflexed! :	: often somewhat de- : flexed	: often slightly deflexed. :
Leaf-blades, lobation	: rather deeply 5-lobed	: pedately 5-parted	: very deeply 5-lobed
" " , lobes	: oblong-ovate :	: lance-elliptic or : lanceolate	: oblong-lanceolate :
" " apex	: short-acuminate, : mostly sharply so	: attenuate-acuminate, : often setose at tip	: sharply acuminate, often : setose-tipped
" " , sini	: exceptionally very : short-toothed in : upper sini	: not toothed in sini : :	: not toothed in sini : :

Characters	: Nanking (824)	: Thurberi	: F <sub>1</sub>
Leaf-blades, upper sin:	: broad, rounded at base	: very narrow, acutish : at base	: very narrow, but obtuse : at base
" " midlobe	: slightly constricted : at base	: strongly constricted : at base, often as if stalked	: strongly constricted at base, but less than in Thurberi
" " length	: up to 7 cm.	: up to 15 cm.	: up to 10 cm.
" " basal lobes:	divergent	: usually moderately to strongly reflexed	: divergent or somewhat reflexed
" " nectary	: very small, less than: 1 mm., usually on midvein only, circular, short-elliptic : or broadly triangular : lar, well defined	: 1 to 4 mm. long, triangular or elliptic	: on midvein only, 3-angular, 1 to 2 mm. long
Peduncle	: declined usually : before anthesis, : terete or nearly, : not furrowed	: erect or ascending, : angular, furrowed	: erect, ascending or spreading, strongly angled, furrowed
Involucel, bractlets	: nearly separate to strongly connate, : not spreading	: separate, spreading	: separate, or slightly connate, erect or nearly so, ovate, shallowly cordate
" " shape	: cordate-ovate	: lanceolate	: ovate, shallowly cordate
" " length:	25 mm.	: 7 to 15 mm.	: 17 to 20 mm.
" " margin:	: with few very short teeth near apex	: entire, or with 2 or 3: short subulate teeth	: rather deeply 3 to 5-toothed but not to the middle, teeth 3-angular-lanceolate, setaceous-tipped
Calyx margin	: entire or unilate : (sometimes dentate?)	: usually entire or undulate	: undulate or very shallowly crenate
" length at anthesis	4 mm.	: 4 mm.	: about 2.5 mm.
" nectaries	: very large, inverted : delta-shaped	: none	: none or indefinite
Corolla, shape and length	: (usually pendent)? : about 25 mm.	: rather shallowly cup-shaped, 25 to 30 mm. : long	: campanulate : 25 mm.

Characters	: Manking (824)	: Thurberi	: F <sub>1</sub>
Corolla, petals	:ciliate not very : densely, near base	:densely ciliate on : claws	:copiously ciliate near : base
" "	color : picric-yellow	: white	: nearly white
" "	spots : large, solid :	:none, or faint, : striate	: grade 7 or 8 :
Pollen, color	:light cadmium or : bright yellow	: cream	: orange
Pistils, color	:whitish, with yellow : oil-glands	:pale green, with : deeper green oil- glands	:pale green with brown : oil-glands

: peruvianum (662) : Darwinii (702) : F<sub>1</sub>

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These two forms (C.B. 662 and 702) are practically identical in leaf characters. In both the older leaf-blades are dotted above with lighter colored dots. This is not strictly an inter-species hybrid.

Characters	: purpurascens	: tomentosum	: F <sub>1</sub>
Bark of twigs and petioles	: dark purple, nearly black, <i>shiny, warty</i>	: pale green, not shiny, not warty	: dark purplish brown, not shiny, not warty
Twigs, pubescence	: soon glabrous	: whitish tomentose with extremely short hairs	: densely soft pubescent, hairs longer than in tomentosum
Petioles, "	: glabrate	: like the twigs	: like the twigs
"	: much longer than the blades	: about equalling the blades	: about equalling the blades
Leaf-blades, color	: deep green tinged with purple and with red-dish purple veins, these much deeper-colored beneath	: bluish, then grayish-green	: lighter green than in purpurascens, tinged with purple and purple-veined
" " , glands	: rather conspicuously (beneath) but sparsely black-punctate	: sparsely and inconspicuously black-punctate beneath	: rather conspicuously dark-punctate
" " pubescence	: sparsely to rather copiously pubescent on both faces, especially on the veins, with rather long hairs	: densely whitish tomentose with very short hairs	: like the twigs
" " , length	: up to 13 cm. (probably often longer)	: up to 12 cm.	: up to 15 cm.
" " , lobation	: deeply 5-7-lobed	: rather deeply 5-lobed	: deeply 5-lobed
" " , lobes	: ovate or oblong-ovate, often coarsely dentate	: ovate or oblong-ovate	: lance-ovate or oblong-ovate
" " apex	: sharply short-acuminate	: short-acuminate, usually acutely so	: sharply acuminate
" " pulvinus	: large, liver-colored	: small, pale green	: large, purplish brown
" " nectaries	: 1 to 3, large and deep; triangular-elliptic or elongate, up to 10! mm. long	: none	: small, $\pm$ triangular, near base of midvein only, often poorly defined or none

Characters	purpurascens	tomentosum	F <sub>1</sub>
Involucel, bractlets	:	:connate only very : near base	: slightly connate :
" " shape	:	:oblong or oblong- : ovate	: oblong-ovate :
" " margin	:	:dentate on nearly : whole margin, teeth : short, deltoid- : subulate	:teeth few, long, lance- : subulate, setaceous- : acuminate :
" bractlets, nectaries	:	: none :	: 2 or 3, well-defined :
Calyx margin	:	: entire	: entire or undulate
" oil-glands	:	:rather numerous, black	: numerous, black
Corolla, shape	:	:very open-campulate:	
Petals, color	:	:brilliant lemon- : yellow	:clear yellow, paler than : tomentosum
" surface	:	: glossy	: not glossy
" spots	:	: spotless	: spotless
Filaments	:	:long and slender, : yellowish	: long
Pollen, color	:	:cream, changing to : pale yellow	:yellow, about same color : as petals
Stigmas	:	:long exerted, very : slender	:very long, equalling or : longer than column, oil- : glands numerous, black

Characters	: sanguineum	: africanum	: F <sub>1</sub>
Twigs and petioles	: densely villous- : hirsute with long, : mostly simple hairs	: copiously villous- : hirsute with very : long hairs	: copiously villous- : hirsute with very long, : mostly simple hairs
Bark of twigs	: dark brown, becoming : nearly black	: green, becoming : reddish brown	: reddish brown, becoming : near black
" , older	: light brown	: green, with very : numerous light-brown : lenticels	: as in africanum
Leaf-blades, pubescence	: short-stellate and : long villous on veins: : especially beneath	: copiously soft- : stellate, pubescent : on both faces, : sparsely long-villous : on veins beneath	: as in africanum
" " texture	: rather firm	: rather soft	: intermediate
" " color	: rather light green, : tinged with purple : and with reddish veins	: yellowish, becoming : deep green above, : veins not colored	: as in africanum
" " (larger) length	: 8.5 cm.	: 9 cm.	: 8.5 cm.
" " " width	: 8 cm.	: 12 cm.	: 9 cm.
" " lobation	: deeply 5-lobed	: rather shallowly : 5-lobed	: deeply 5-lobed
" " lobes	: oblong-lanceolate or : ovate-oblong	: broadly ovate or : nearly orbicular	: ovate or oblong-ovate
" " apex	: sharply short-acumi- : nate	: usually acutish, : often mucronate	: short acuminate, often : mucronate
" " midlobe	: up to 27 mm. wide : somewhat constricted : at base	: up to 55 mm. wide, : distinctly con- : stricted towards base	: up to 40 mm. wide, : constricted at base
" " nectary	: none	: on midvein only, : small but prominent	: on midvein only, very : small but distinct
Peduncle	: erect or spreading, : often somewhat : decurved after anthe- :	: ascending or spread- : ing before anthesis, : sometimes decurved : afterward	: as in parents
Involucel, color	: bronze-purple	: green	: green tinged with purple
" bractlets, base:	: subcordate	: deeply cordate	: deeply cordate

Characters	: sanguineum	: africanum	: F <sub>1</sub>
Involucel, bractlets, margin	: entire or very shallowly few-toothed near apex, teeth very few and very short, 5-angular-subulate	: deeply lacinate on most of margin with 3-angular-lanceolate-setaceous teeth	: rather deeply lacinate on most of margin, teeth triangular-setaceous
Calyx, nectaries	: none	: usually present, large; inverted delta-shaped	: large, functional, inverted delta-shaped
Petals	: only slightly ruffled	: conspicuously ruffled	: conspicuously ruffled
" color	: spinel-red above, whitish below	: pale or bright yellow	: pomegranate-purple above, yellowish below
" spots	: occupying nearly 1/2 of petal	: occupying 1/4 to 1/3 of petal	: solid, intermediate in size
Anthers, color	: purplish brown	: near xanthine-orange	: pale orange, tinged with red
Pollen, "	: pale yellow	: orange	: orange

Characters	: sanguineum	: Stocksii	: F <sub>1</sub>
Stem	: erect, vegetative : branches ascending	: low, branches : trailing	: erect, vegetative : branches numerous, : wide-spreading
Fruiting branches	: slender, short, spread- : ing or slightly : decurved		: slender, wide-spreading : or somewhat drooping
Bark of twigs	: dark brown, becoming : nearly black		: like sanguineum
Petioles, pubescence	: densely villous-hirsute : with long, mostly : simple hairs	: sparsely stellate- : puberulent	: copiously short- : pubescent, hairs : mostly stellate
Leaf-blades, pubescence	: short-stellate, and : long-villous on veins, : especially beneath	: like the petioles	: rather copiously : short-stellate- : pubescent
" " (larger) length	: 8.5 cm.	: 3.5 cm.	: 8 cm.
" " " width	: 8 "	: 4.5 "	: 10 "
" " lobes	: oblong-lanceolate or : ovate-oblong, sharply : short-acuminate at : apex	: nearly orbicular, : very obtuse or trunc- : ate at apex, : mucronate	: deeply 5-lobed, lobes : oblong-ovate, acute, : and mucronate at apex, : often several-cleft
" " basal sinus	: broad and very shallow: : open, or almost none	: shallow and broadly : triangular, or : rather deep & narrow:	: shallow or deep, : broadly 3 angular, open
" " upper sinuses	: deep and narrow, : rounded at base	: deep and narrow, : closed by overlap- : ping	: open, but often closed : by overlapping above : the rounded base
" " pulvinus	: conspicuous, reddish : brown	: very small, scarcely : colored	: greenish, or tinged : with brown
" " nectary	: none	: minute, well above : base, or none	: none, very small but : sharply defined on : midvein or lateral, : more often none
Involucel, color	: bronze-purple	: green	: purplish brown
" length	: 25 mm.	: 20 to 23 mm.	: 20 mm.

Characters	: sanguineum	: Stocksii	: F <sub>1</sub>
Bractlets	: strongly connate, : not clawed	: separate, : clawed	: separate, not clawed, : deeply cordate
" , margin	: entire, or very shallowly : lowly few-toothed : near apex	: very deeply lacinate, : ate, 1/2 way to : base, or more	: deeply lacinate with : numerous teeth on : nearly whole margin
" teeth	: very few and very : short, near apex, : subulate	: subulate, setaceous- : acuminate	: fairly long, lance- : subulate, setaceous- : acuminate
" nectaries	: none, or rudimentary :	: present, but apparently : entirely non-functional	: 3
" pubescence	: rather sparsely : pubescent	: sparsely puberulent :	: stellate-puberulent :
Calyx, pubescence	: glabrous	: rather densely : short-pubescent	: short-stellate
" margin	: shallowly dentate with : broadly deltoid, : acutish teeth	: deeply dentate, : with long, subulate : teeth triangular at : base	: short-dentate with : deltoid-subulate, : acute teeth
" oil-glands	: few, conspicuous	: very few and small, : black	: very few
Petals, length	: 30 mm.	: 20 to 25 mm.	: 30 to 35 mm.
" color	: spinel-red above, : whitish below	: near sulphur yellow :	: deep rose
" spots	: huge, occupying nearly : 1/2 of petal, very : intense	: rather large (6 to : 8 mm. long) but not : very solid	: fairly large and intense
Pollen, color	: pale yellow	: paler than beryta : yellow	: deep cream
Pistil, length	: 15 mm.	: about 12 mm.	: 12 mm.
Stigmas	: barely exerted	: well-exserted	: short but exerted

Characters	Sturtii	Armourianum	F <sub>1</sub> <sup>1/</sup>
Plant, pubescence	: glabrous except petals	: obscurely puberulent	: minutely granular,--
	:	: soon glabrous	: puberulent on very
	:	:	: young parts, very
	:	:	: soon glabrous
Fruiting branches	: very short, strongly	: very short (1 to	: mostly not more than
	: ascending, mostly	: 4 cm.) the flower	: 15 cm. long and
	: 1-flowered	: usually solitary	: 2 or 3-flowered,
	:	: and appearing	: ascending
	:	: terminal, peduncle	:
	:	: articulated	:
Bark of twigs	: pale green or reddish	: reddish, somewhat	: reddish, glaucous
	: brown, glaucous	: glaucous	:
Bark, older	: light grayish brown	: light reddish brown	: darker than in Sturtii,
	:	:	: grayish brown
Stipules	: about 7 mm. long,	: 1.5 to 2.5 mm. long,	: 3 to 4 mm. long,
	: lanceolate, caducous	: subulate, fugacious	: lance-subulate,
	:	:	: fugacious
Leaf-blades, color	: bluish green, very	: dark or yellowish	: intermediate
	: glaucous	: green, not glaucous:	
" " length	: up to 8 cm.	: 2 to 3.5 cm.	: up to 5.5 cm.
" " surface	: not shiny	: shiny on both faces	: not shiny, except
	:	:	: when very young
" " shape	: ovate, acutish,	: rounded-deltoid,	: broadly ovate, acute <sup>or</sup>
	: cuspidate	: obtuse or acutish,	: and abruptly very
	:	: often mucronate	: short-acuminate,
	:	:	: mucronate
" " basal sinus	: very short and narrow	: open, broadly tri-	: very short or almost
	:	: angular	: none, open
" " pulvinus	: pinkish	: greenish or brownish:	: pinkish
Peduncle	: very short, terete,	: terete(?), striate	: terete, scarcely striate
	: not striate	:	: about 1 cm. long
Involucrel	: persistent to maturity	: deciduous long	: more persistent than
	:	: before anthesis	: in Armourianum
" bractlets, length:	about 20 mm.	: 2 to 5 mm.	: about 12 mm.
" " , shape	: broadly ovate or oblong:	: subulate or narrowly:	: widely separate, broadly
	: ovate, short-acuminate:	: lanceolate, acumi-	: lanceolate, entire or
	: and cuspidate	: nate	: minutely very few-
	:	:	: denticulate near apex,
	:	:	: acuminate

1/ Flower characters from herbarium specimens. The flower-buds nearly always shed before anthesis.

Characters	Sturtii	Armourianum	F <sub>1</sub>
Involucel ext.	:	:	: 5 large, rounded-
nectaries	: 5, usually red	: none	: inverted-delta-
	:	:	: shaped or nearly
	:	:	: circular
Calyx at anthesis,	:	:	:
length	: 6 mm.	: 5 to 10 mm.	: 6 to 7 mm.
" " " , margin	: dentate with triangu-	: like Sturtii	: <sup>deeply</sup> dentate with subulate
	: lar-subulate teeth	:	: teeth
Petals, length	: 5 to 6 cm.	: 2.5 to 4.5 cm.	: 3 cm.
" color	: pale mauve	: pale-green yellow	:
" spots	: about 15 mm. long, : conspicuously : feathered	: 5 to 10 mm. long, : solid or striate, or: : wanting	: about 9 mm. long, : feathered as in Sturtii
Anthers, connective	: bordered with deep red	: bordered with car- : mine or dark purple	: bordered with deep : color (carmine?)
Filaments and anthers	: both pansy-purple	: filaments often pur- : plish, anthers pale	:
	:	: orange	:
Pollen, color	: cream	: near apricot-yellow	:
	:	:	:

Characters	Sturtii	Harknessii	F <sub>1</sub>
Plant, pubescence	: glabrous, except : petals :	: densely puberulent : :	: obscurely granular- : puberulent on very young : parts, soon glabrous
Fruiting branches	: very short, strong- : ly ascending, : mostly 1-flowered :	: 1 to 4 cm. long, : flower usually soli- : tary and appearing : terminal	: up to 10 cm. long, : ascending, usually : 1-flowered
Bark of twigs	: pale green or red- : dish brown, very : glaucous	: greenish or brownish, : not glaucous :	: reddish brown, somewhat : glaucous
Leaf-blades, color	: bluish green, very : glaucous	: yellowish green, : not glaucous	: light green, slightly : glaucous
" " length	: up to 8 cm.	: 5 to 6 cm.	: up to 5 cm.
" " lobation	: entire	: shallowly 3-lobed	: entire to rather deeply : 3-lobed (much more than : in Harknessii.)
" " shape	: ovate, acutish, : cuspidate	: broadly deltoid, : short-acuminate or : acutish and micro- : nate	: broadly deltoid, subcor- : date, acuminate
" " pulvinus	: very small, reddish- : or pinkish	: very small, greenish- : or brownish	: very small, brownish : or pinkish
Peduncle	: very short, terete, : not striate	: quadrangular(?) : striate	: less than 1 cm. long, : terete, scarcely : striate
Involucl	: persistent to : maturity	: deciduous at, or : shortly before, : anthesis	: more persistent than : in Harknessii
" bractlets, length	: ± 20 mm.	: 10 to 25 mm.	: 22 to 25 mm.
" " margin	: entire, or very : nearly so.	: entire to few- : dentate near apex	: undulate or very few- : denticulate or dentate : near apex
" " base	: narrowed	: somewhat narrowed : and rounded	: narrowed
" ext. nectaries	: 3, usually red	: none	: 3, rather large, in- : verted delta-shaped : or nearly circular

Characters	Sturtii	Harknessii	F <sub>1</sub>
Calyx at anthesis, length	6 mm.	6 to 8 mm.	about 7 mm.
" " " margin	dentate with 3- angular-subulate teeth	undulate or denticulate	dentate with deltoid, very acute teeth
" oil-glands	numerous, prominent, black	few, greenish	numerous, prominent, black
Petals, length	3.5 to 6 cm.	3 to 5 cm.	2.5 to 5 cm. <sup>1/</sup>
" color	pale mauve	light green-yellow	rather dingy color, between rose pink and hellebore red
" margin	slightly erose, scarcely ruffled	conspicuously ruffled	slightly erose, scarcely ruffled
" spots	about 15 mm. long, conspicuously feathered	none	about 10 mm. long like Sturtii, but less feathered
Anthers, connective	bordered with deep red	bordered with carmine, or some- times not	whole anther brownish purple
Filaments, length of lower	1.5 to 2 mm.	3 mm.	1 to 1.5 mm.
" , color	purple	whitish	purplish
Pollen, color	cream	apricot yellow to light cadmium	yellow
Column, length	17 mm.	+ 17 mm.	12 mm.

<sup>1/</sup> Not more than 2.5 cm. in 1937.

Characters	Thurberi	Sturtii	F <sub>1</sub>
Twigs and petioles	: quadrangular	: rounded, but some-	: rounded-quadrangular
" " "	: glabrate	: glabrous	: very soon glabrous
Bark of twigs	: reddish brown, or : tinged therewith, : not (?) glaucous	: pale green or reddish: : brown, glaucous	: green tinged with red, : somewhat glaucous
Leaf-blades, texture	: thin	: thickish	: thickish
" " color	: bright green	: bluish, very glaucous:	: green, slightly glaucous
" " pubescence	: ciliate and puberu- : lent on veins	: glabrous	: minutely pruinose when : very young, soon glabrous
" " length	: up to 15 cm.	: up to 8 cm.	: up to 9 cm.
" " lobation	: pedately 3- to : 5-parted	: entire	: entire to deeply and : narrowly 3-lobed
" " apex	: attenuate-acuminate, : sometimes setose- : tipped	: acutish, cuspidate	: long-acuminate, setose : at apex
" " basal sinus	: very open, triangular:	: very short and : narrow	: very shallow, narrow : but usually open at base
" " pulvinus	: small, greenish or : brownish	: very small, pinkish	: very small, greenish : brown
Peduncle	: up to 2 cm. long, : sharply angular and : furrowed	: very short, terete, : not furrowed	: as in Thurberi
Involucel at anthesis:	spreading	: somewhat spreading	: somewhat spreading
" bractlets,	:	:	:
length	: 7 to 15 mm.	: 20 mm.	: 17 to 19 mm.
" " shape	: lanceolate	: broadly ovate, or : oblong-ovate	: rather broadly lanceolate
" " margin	: entire or 2 or 3- : dentate with short : subulate teeth	: entire or very nearly:	: entire or with 1 or 2 : triangular-setose teeth
Calyx at anthesis,	:	:	:
length	: + 4 mm.	: 6 mm.	: 5 to 6 mm.
" " " margin	: usually entire or : undulate	: dentate with triangu- : lar-subulate teeth	: abruptly dentate with : deltoid-subulate, : very acute teeth

Characters	: Thurberi	: Sturtii	: F <sub>1</sub>
Corolla, shape	: shallowly cup-shaped	: open-campanulate	: open-campanulate
Petals, length	: 25 to 30 mm.	: 35 to 60 mm.	: 35 to 40 mm.
" , color	: white	: pale mauve	: between white and pale : amaranth-pink
" , margin	: slightly erose	: slightly erose, not : ruffled	: shallowly erose and : slightly ruffled
" , spot	: striate, or none <sup>1/</sup>	: 12 to 15 mm. long, : feathered	: 12 to 13 mm. long, like : Sturtii but larger : relative to petal
Filaments, length	: 3.5 to 4 mm.	: 1.5 to 2 mm.	: about 2.5 mm.
" , color	: white (?)	: purple	: purple
Anthers, color	: cream-colored with : dull orange connect- : ive	: pansy-purple : :	: daphne pink : :
Pistil, color	: pale green, with : deeper green oil- : glands	: white, with black : oil-glands :	: white, with black : oil-glands :

<sup>1/</sup> The 2 plants of Thurberi in 1937 have spotless petals.

COTTON HYBRIDS AT RIVERSIDE, CALIF. 1936.

F <sub>1</sub> Hybrids (W numbers)	:	CB and W numbers of parents.
#1 (barbadense x Schottii) x anomalum	:	W 46 x 1051
#3 herbaceum x cernuum	:	743 x W 15 (W 15 seems good cernuum)
#8 Armourianum (spotless) x Thurberi	:	867 x 112 (both parents spotless)
#9 Armourianum x Thurberi	:	867 x 112 (Thurberi parent spotted)
#10 Davidsonii x Klotzschianum	:	101 x 700
#21 hirsutum x cernuum	:	W 64 x W 15 (W 64 Red Acala)
#25 hirsutum x barbadense(?) Br. Mohauvz	:	723 x 204a
#26 contextum x Hopi	:	542 x 716
#27 sanguineum x anomalum	:	787 x 1051
#28 barbadense x tomentosum	:	W 23 x 527 (W 23 Pima, 20th gen. inbred)
#29 hirsutum x tomentosum	:	723 x 527 (723 hirsutum from Rhodesia)
#33 barbadense x Sturtii	:	W 5 x 564 (W 5 barbadense 1 gen. inbred) 1/
#34 hirsutum x Armourianum	:	W 24 x 867 (W 24 Acala, 9 gen. inbred)
#35 Sturtii x Harknessii	:	564 x 861 (564 = 632)
#36 barbadense x Harknessii	:	W 5 x 861 (W 5 barbadense, 1 gen. inbred)
#37 hirsutum x Thurberi	:	W 24 x 112 (W 24 Acala, 9 gen. inbred)
#38 barbadense x Harknessii	:	W 23 x 861 (W 23 Pima)
#39 Sturtii x Harknessii	:	564 x 861
#40 Sturtii x Armourianum	:	564 x 867
#41 Harknessii x Armourianum	:	861 x 867
#43 hirsutum x Armourianum	:	W 24 x 867 (W 24 Acala, 9 gen. inbred)
#44 hirsutum x Thurberi	:	W 12 x 112 (W 12 Rowden Lintless, 1 gen. inbred)
#45 sanguineum x africanum	:	787 x 419
#46 barbadense x Schottii	:	W 23 x 672 (W 23 Pima)
#47 hirsutum x punctatum	:	(not in field in 1936)
#48 herbaceum x neglectum	:	743 x 785
#49 barbadense x Schottii	:	W 23 x 672 (W 23 Pima)
#50 hirsutum x barbadense	:	723 x W 23 (723 hirsutum, Rhodesia, W23 Pima)
#51 contextum x Schottii	:	542 x 672
#52 Sturtii x Harknessii	:	564 x 861 (564 = 632)
#53 barbadense x punctatum	:	(not in field in 1936)
#54 ditto	:	W 23 x 437 (W 23 Pima)
#55 (contextum x Hopi) x anomalum	:	W 26 x 1051
#56 contextum x Armourianum	:	542 x 867
#57 barbadense x Sturtii	:	W 5 x 632 (W 5 barbadense (Sea Island?))
#58 <del>thespedioides</del> x Sturtii <i>Thurberi</i>	:	112 x 632
#59 Davidsonii x Sturtii	:	101 x 632
#79 Hanking x Thurberi	:	824 x 112
#80 hirsutum (Red) x tomentosum	:	W 64 x 527 (W 64 Red Acala)
#81 hirsutum (Red) x Sturtii	:	W 64 x 632 (W 64 " " )
#82 hirsutum x Sturtii	:	723 x 632
#95 purpurascens x tomentosum	:	531 x 527 (531 = 671)
#99 sanguineum x Stocksii	:	787 x 763
#101 Armourianum x ? (mutant?)	:	867 x ?
#111 herbaceum x Sturtii	:	743 x 632
#139 hirsutum x Sturtii	:	W 24 x 632 (W 24 Acala, 9 gen. inbred)

1/ The W 5 parent looks like Sea Island cotton, seeds nearly naked.

RANGANATHA RAO'S GREEN-SEED HYBRIDS.

(Gossypium herbaceum x G. arboreum)

Notes made at Riverside, September 28, 1936.

C.B. 1045. Old bark light brown, young bark green or purplish. Stems and petioles much more hirsute than in either parent species. Leaves, including petioles green, the blades nearly intermediate in shape and depth of lobing except that, in width of the lobes, the hybrid is nearer herbaceum. Leaf-blades very crispate-margined (a non-parental character). Bractlets strongly connate, more lacinate than in either parent. Petals pale yellow with very large, mahogany-red spots (herbaceum colors). Bolls 3-4-lobed, ovoid, with a very short and blunt point, pea-green, very shallowly and irregularly pitted.

C.B. 1046. Differs from #1045 in the darker brown (nearly black) young bark, leaf-blades with less acuminate lobes and non-crispate margins, bractlets less deeply lacinate, bolls more pointed and with a smoother surface.

#1045 is more like herbaceum in shape of bolls, more like arboreum in the rougher surface of the bolls. In #1046 the approach is to arboreum in boll-shape, to herbaceum in boll surface. G. arboreum has more pointed and more deeply pitted bolls than either of the hybrids. G. herbaceum has rounder, less pointed and smoother bolls than either hybrid.

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Dr. Loebber

sanguineum x Stocksii

(Riverside, Calif., Aug. 23, 1935)

W 99. Plant erect, slender (about 4 feet high with terminal bud aborted) open, with several ascending vegetative branches high on the axis. Young stems, petioles and leaf-blades sparsely short-pubescent. Bark dark brown. Petioles longer than the blades, the latter about as wide as long, deeply 5-lobes with rounded, apiculate lobes that are widest near the middle, pulvinus brown, very small. Bractlets separate, ovate, cordate, deeply lacinate with numerous, fairly long, lance-subulate, setose-tipped teeth. Calyx short-dentate with deltoid-subulate teeth and few oil glands. - The sanguineum parent is hirsute, the leaf lobes are narrower, widest below the middle and more acuminate, the bractlets strongly connate with few and much shorter teeth.

purpurascens x tomentosum

(Riverside, Calif., Sept. 6, 1935)

W 95 (3 plants). About 6 feet high, erect, with numerous ascending vegetative branches high on axis, densely pubescent with very short hairs on young stems, petioles and leaf-blades. Bark dark purplish-brown as are the petioles, pulvinus and leaf-veins. Stipules lanceolate, about 15 mm. long. Leaf-blades rather conspicuously dark-punctate, deeply 5-lobed with lance-ovate, acuminate lobes that are somewhat overlapping at base, the midlobe about twice as long as the undivided portion, one or more of the lobes, especially the basal ones, occasionally with a coarse tooth, with a small, more or less triangular nectary near the base of the midvein.

Has produced no flower buds to date. Resembles the purpurascens parent in nearly all characters except that the latter is glabrescent (pubescent only on the very young parts) and the bark appears darker-colored and shinier.

hirsutum x Sturtii

(Riverside, Calif., Aug. 26, 1935)

W 82. Four young plants, light green, sparsely pubescent on the young parts, stems glaucescent. Leaves nearly as wide as long, entire to shallowly 3-lobed, the midlobe up to 1/2 the length of the blade, deltoid, acuminate. Pulvinus rather large, brown. Bractlets deeply laciniate with few, lance-subulate teeth, separate or somewhat connate, ovate, 2.5 to 3.5 cm. long. Calyx deeply dentate with deltoid-subulate teeth. Corolla about 5 cm. long, nearest Tyrian pink (XII) with Sturtii-like spots, between pomegranate-purple and Bordeaux (XII) these often very faint in one of the plants. Column resembling that of Sturtii except for the much greater length of the purple filaments. Stigmas shorter than in Sturtii.

herbaceum x Sturtii

(Riverside, Calif., Aug. 26, 1935)

W 111. Plant with a well-developed axis and numerous, ascending vegetative branches along its length. Stems and leaves glabrous or very nearly so, slightly glaucous (much less so than in Sturtii). Leaves entire to 3-lobed, the midlobe broadly deltoid,  $1/3$  to  $1/2$  the length of the leaf. Pulvinus very small, light brown. Bractlets brownish, separate, about 15 mm. long, broadly ovate, rather deeply lacinate with several slender teeth. Calyx reddish, deeply dentate with subulate teeth. Corolla about 5 cm. long, petals nearest deep rose-pink (XII) with large Bordeaux (XII) spots that are broader than in Sturtii but feathered at the edge as in that species. Column elongate, much as in Sturtii but the lower filaments longer. Filaments purple, anthers reddish-orange, connectives whitish. Exserted portion of pistil short.

In general, resembles Sturtii much more than herbaceum.

Harknessii x Armourianum

(Riverside, Calif., July-September, 1934)

W 41 (2 plants). No flower buds have appeared to date (Sept. 8). Much like Harknessii in general appearance but plant more open and with more ascending branches than either parent. Obscurely puberulent on the very young parts, soon glabrous. Twigs more highly colored than in either parent, light mahogany colored, older bark light brown. Leaf blades grayish green (yellowish in Harknessii, deeper green in Armourianum), less shiny above than in Armourianum, nearer Harknessii in size and shape, entire to very shallowly 3-lobed with rounded lobes (similarly but less deeply than in Harknessii), broadly ovate, obtuse or acutish, rather deeply cordate.

(Riverside, Calif., Aug. 26, 1935)

W 41. Plant fragrant like Armourianum, more like Harknessii than Armourianum in its relatively tall growth, in the color and rather dull surface of the leaves, larger size of the leaves and their tendency to trilobation, although they are less deeply lobed than in Harknessii, with relatively shorter midlobe. Involucel more persistent and much larger than in Armourianum, bractlets lanceolate, entire (?) about 1 cm. long. Calyx conspicuously dentate with short, deltoid teeth, oil glands numerous. Corolla pale green-yellow (V) with conspicuous pomegranate-purple (XII) spots (about grade 8). <sup>1/</sup> Anthers orange with red-bordered connectives. <sup>2/</sup> Filaments tinged with purple. Pollen orange. Exserted portion of pistil longer than column, thickly and conspicuously dotted with reddish glands, the stigmas united to apex. Bolls rounded and depressed (as in G. Harknessii at Riverside) and of about the same size as in that species, the inner margins of the valves copiously long-ciliate (Harknessii character). Seeds with pale brown hairs (Armourianum character).

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<sup>1/</sup> The plant of G. Harknessii at Riverside has spotless petals but the original description of the species gives them as spotted.

<sup>2/</sup> The adjacent plant of G. Harknessii shows very little, if any, red color on the connectives.

Armourianum x ?

(Riverside, Sept. 17, 1936)

W 101 (2 plants). Intricately branched, with divergent branches. Young bark light brown, old bark brownish grey. Plant glabrous except the very young parts, which are puberulent. Leaf blades small (not more than about 5 cm. long), appearing diseased, more or less cuneate at base, deeply and narrowly 3-lobed, the lobes lanceolate, ascending at a narrow angle; a nectary on midvein only, about 1/2 way to base of midlobe, relatively large, deltoid. Bractlets separate, distant, oblong, deeply 5-7-toothed towards apex with lance-subulate, setaceous-tipped teeth; a large nectary at base of each bractlet. Calyx with merely undulate margin, no nectaries, and numerous oil-glands. Corolla about 40 mm. long, more than twice as long as the involucl, funnelform, pale yellow, fading pinkish, faintly spotted (grade 2 to 3+). Stamens numerous, with ascending filaments, these and the connectives purplish. Pollen orange. Stigmas long-exserted, nearly equalling the column, with black oil-glands.

Armourianum x thespesioides (Thurberia) F<sub>1</sub>

(Riverside, September 17, 1936)

W 8 and 9 (1 plant of each). Plant much more open than Armourianum, the numerous branches much longer and more spreading. Old bark gray-brown, that of twigs purplish green or purplish gray. Plant glabrous except for some puberulence on the very young parts. Leaves grayish green (very different from the grass-green of Armourianum). Leaves deeply 3-lobed, the lobes broadly lanceolate or ovate-lanceolate, occasionally 1-cleft, acuminate but obtusish and mucronate at apex, shallowly cordate with a very narrow basal sinus; pulvinus very small, brownish; nectary near base of midvein only, small, round, deltoid, or somewhat elongate. Bractlets entire, lanceolate, acuminate, deciduous in a very early stage of the flower-bud, and about as long as or somewhat longer than the calyx at that stage; a rather large nectary at base of 2 or all 3 bractlets. Calyx abruptly 5-dentate, teeth deltoid, acute; nectaries none; oil glands numerous, very small, greenish. Corolla about 25 mm. long, open-campanulate (Thurberia-shaped); petals ochroleucous (decidedly yellower than in Thurberia), yellower towards base, pinkish where exposed in bud, spotless in all flowers on one plant (W8), very faintly spotted (grade 1 or 2) in some flowers of W9. Filaments rather long, purplish towards apex as are the connectives. Pollen pale orange on one plant, cream on the other. Stigmas long (about 10 mm.), dotted with reddish brown oil glands. Bolls mostly 3-lobed, about 15 mm. long and nearly as wide, rounded-ovoid, nearly mucous, olive-green; oil glands numerous but surface not pitted.

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<sup>1/</sup> The Armourianum parent had spotless petals, the thespesioides parent of W8 had spotless petals, that of W9 had faintly spotted petals.

(barbadense x Schottii, F<sub>1</sub>) x anomalum, F<sub>1</sub>

(Riverside, September 22, 1936)

Wl. Stem tall, slender, erect, with very few branches, these ascending at a narrow angle. Bark dark purplish brown, nearly black. Very young twigs and petioles rather densely soft stellate-pilose, with a few long, flaccid, simple hairs. Leaf-blades stellate-pilose beneath, glabrate above, shallowly cordate with an open basal sinus, very deeply 5-lobed, the lobes oblong-lanceolate, sharply long-acuminate; veins purple, pulvini nearly black; nectaries near base of the 3 principal veins, sharply defined, deltoid or rounded. Bractlets separate and rather distant, ovate, subcordate, cleft to below the middle with numerous long, lanceolate, setaceous-acuminate teeth; nectaries conspicuous at base of 2 or all 5 of the bractlets. Calyx moderately ribbed (much less prominently than in anomalum, scarcely more than in barbadense and hirsutum), 5-dentate, with teeth acute or one or more of them elongate and subulate from a deltoid base; oil glands numerous, very small. Corolla (late season) little surpassing the involucrel, funnelform (anomalum character); petals very pale yellow, fading pink, with very large, pomegranate-purple spots. Column elongate. Filaments short, white. Pollen golden-yellow, as in Pim. Stigmas well-exserted but short. Boll (very young) 4-lobed, sharply acuminate, the surface smooth but with the oil-glands apparent.

barbadense x tomentosum, F<sub>1</sub>

(Riverside, September 18, 1936)

W 23 (3 plants). Stem tall, erect, stout, with few, ascending vegetative branches and spreading fruiting branches. Bark green and red. Young leaf-blades and petioles grayish tomentose with very short hairs (as in tomentosum), the pubescence becoming much sparser with age and the leaf blades becoming much darker green than in tomentosum. Leaf blades large, nearly quadrangular in outline, deeply 5-lobed with oblong-ovate, acuminate lobes, deeply cordate with a closed basal sinus, deep green when older; pulvinus dull brown; nectaries small and indistinct at base of the midvein and (or) one of the principal lateral veins, seldom on all 3 veins, apparently sometimes none. Bractlets separate or very nearly so, broadly ovate, deeply cordate, rather shallowly dentate with numerous, lance-subulate, setaceous-tipped teeth; nectaries usually present at base of all 3 bractlets. Calyx margin entire, oil-glands numerous; nectaries present, hairy. Corolla open-campulate; petals bright yellow (deeper yellow than in barbadense) with well-developed spots (grade 6 or 7). Column long, with numerous stamens. Pollen orange-yellow. Stigmas long, with few black oil-glands.

(contextum x Hopi F<sub>1</sub>) x anomalum, F<sub>1</sub>

(Riverside, September 18, 1936)

W 55. Plant very open, with several limbs ascending at a wide angle, and long, nearly horizontal, fruiting branches. Bark light reddish brown. Stems and petioles rather densely hirsute. Leaf-blades dark green, densely stellate-tomentose, especially beneath, deeply 5-lobed, with broad-ovate, rather abruptly short-acuminate lobes, deeply cordate at base with a narrow but usually open basal sinus; pulvinus dull brown; a small but sharply defined nectary at base of the midvein and smaller ones on the principal lateral veins. Bractlets separate, oblong-ovate in outline, subcordate, with rather large, often colored nectaries, very deeply cleft, with few (usually 5), long, lanceolate, setaceous-acuminate teeth. Calyx 5-dentate with deltoid-subulate teeth of variable length, the veins prominent but much less so than in anomalum; oil-glands numerous. Corolla funnelform-campanulate, never widely expanded (anomalum character) about  $1\frac{1}{2}$  times as long as the involucrel; petals ochroleucous, tinged with pink where exposed in the bud, with relatively very large, pomegranate-purple spots (about grade 12). Filaments rather short, spreading. Pollen pale yellow. Stigmas well-exserted.

Davidsonii x Klotzschianum, F<sub>1</sub>

(Riverside, September 22, 1936)

W 10 (3 plants). Main stem erect, with numerous, long, ascending or spreading limbs. Young bark reddish, older bark light brown. Young twigs, petioles, leaf blades and involucels velvety tomentose with very short hairs. Leaf blades ovate, truncate or slightly subcordate at base, sharply long-acuminate, entire or very shallowly 2-3-lobed; pulvinus small, brown; nectary near base of the midvein only, small but sharply defined. Bractlets separate, broadly ovate, deeply cordate, dentate on nearly the whole margin with lance-subulate, setaceous-acuminate teeth; nectaries small and inconspicuous. Calyx with entire or undulate margin, no nectaries, and numerous, but inconspicuous, greenish oil-glands. Corolla  $\frac{1}{2}$  open-campanulate, about 40 mm. long; petals bright yellow (deeper yellow than in Davidsonii), crisped and slightly cross at summit, with strongly asymmetric, striate, Klotzschianum-like spots of grade 5+. Column rather short but stamens numerous. Filaments rather short, yellowish. Anthers pale orange. Pollen nearly colorless. Stigmas long-exserted, closely twisted, with pale green oil-glands.

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$\frac{1}{2}$  Only one flower was available for examination.

Harknessii x Armourianum, F<sub>1</sub>

(Riverside, September 17, 1936)

W 41 (1 plant). The plant characters were noted in 1934. Leaf blades with a very small, deltoid nectary near the base of the midvein. Involucel caducous when the bud is about 8 mm. long, hence somewhat more persistent than in Armourianum but much less so than in Harknessii, the bractlets lanceolate or ovate-lanceolate, about 12 mm. long and 4 to 5 mm. wide, acuminate, entire or very shallowly 1-2-dentate; a large inverted delta-shaped nectary at the base of each bractlet, externally. Calyx very shallowly 5-dentate with broadly deltoid, acute teeth; nectaries none. Corolla about 35 mm. long, very broadly campanulate. Petals pale yellow, reddish where exposed in the bud, with small but intense spots (grades 6 to 8), shallowly erose and crispate on the margin. Column rather short. Filaments ascending, these and the connectives tinged with pink. Pollen orange. Stigmas long-exserted, longer than the column, copiously dotted with red-brown oil-glands. Bolls about 1 cm. long and wide, not narrowed at apex, slightly depressed, mucous, surface smooth but oil glands very numerous and conspicuous. Seeds covered with closely appressed, matted, curly, grayish brown hairs.

herbaceum x cernuum, F<sub>1</sub>

(Riverside, September 17, 1936)

W 3 (1 plant). Stem erect, rather slender, with spreading or somewhat drooping branches. Young bark nearly black, old bark light brown. Young branches and petioles densely short-stellate-pubescent, with fewer long, spreading, simple hairs. Leaf-blades short-stellate on both faces, with long, spreading, simple hairs on the principal veins beneath, deeply 5-lobed with ovate or oblong-ovate, acuminate lobes, these occasionally rather deeply 1-cleft: more like those of the cernuum parent, but broader, more spreading and more deeply lobed; pulvinus brown; nectary very small, about 1/2 way between base of midlobe and base of blade. Pedicels ascending before anthesis, declined in fruit. Bractlets broadly ovate and deeply cordate, strongly connate, shallowly toothed nearly to the base, the teeth much more numerous and much longer than in cernuum, more like those of herbaceum. Calyx margin merely undulate; nectaries at base, between the bractlets. Corolla about 30 mm. long, not much surpassing the involucrel; petals pale yellow with very large, pomegranate-purple spots. Pollen pale orange. Stigma barely exerted. Bolls of intermediate character, 4-lobed, quadrangular-ovoid, rather abruptly short-acuminate, nearly as smooth as in herbaceum (deeply many-pitted and more tapering in cernuum).

herbaceum x Sturtii, F<sub>1</sub>

(Riverside, Sept. 17, 1936)

W 111 (3 plants). Plant very like Sturtii in habit and appearance but more open, the branches fewer and more spreading, and the foliage darker-colored and less glaucous. Twigs, petioles, pulvinus, and often the leaf-blades purplish (sanguineum character), somewhat glaucous. Plant glabrous except the very young parts. Leaf blades entire or shallowly 2-3-lobed, broadly ovate, subcordate, with a very small basal sinus, acutish and short-cuspidate; nectary near base of midvein only, very small but well-defined. Bractlets separate, 20 to 25 mm. long and about 1/2 as wide, ovate, short-acuminate, shallowly dentate near the apex with 2 to several subulate lateral teeth; a nectary at base of each bractlet. Calyx rather deeply 5-dentate (but cleft not nearly to the middle), the teeth deltoid, acuminate; nectaries none; oil glands few. Corolla about 3 times as long as the involucrel, the petals deep rose-color, with large, dark red, Sturtii-like spots. Column rather long. Filaments rather short, rose-red; connectives purple. Pollen deep cream. Stigmas rather short, but well-exserted.

hirsutum x cerinum, F<sub>1</sub>

(Riverside, September 18, 1936)

W 21. Stem stout, fruiting branches numerous, nearly horizontal. Bark dark brown, becoming nearly black. Branches and petioles rather densely hirsute. Leaf-blades deeply 5-lobed, with oblong-ovate, acuminate lobes, deeply cordate at base with a narrow but open basal sinus, firm, dark-green with red-brown veins and pulvinus, copiously short-pilose on both faces with stellate hairs; a small but sharply defined nectary on the midvein about 1/2 way to base of the midlobe, and smaller ones near base of 1 or both principal lateral veins. Bractlets dark reddish brown, broad, cordate-ovate, strongly connate, deeply and coarsely dentate with numerous, deltoid-lanceolate, setaceous-acuminate teeth; an external nectary at the base of each bractlet. Calyx 5-dentate, with broad-deltoid, acutish teeth; nectaries small but sharply defined; oil-glands rather numerous. Corolla funnelform, not greatly surpassing the large involucrel, tinged with pink especially where exposed in bud and fading to rose-pink, with fairly large and intense (grade 7) pomegranate-purple spots. Column elongate. Filaments ascending, purplish. Pollen orange-yellow. Stigmas well-exserted but much shorter than the column.

hirautum (Red Acala) x Sturtii F<sub>1</sub>.

(Riverside, September 17, 1936)

W 81 (3 plants). Plant open, with numerous nearly horizontal or somewhat drooping fruiting branches. Bark brown-purple, glaucous. Plant sparsely to rather copiously stellate-puberulent. Leaves dark green, usually heavily mottled with dark red, the blades entire or very shallowly 2-3-lobed, broadly ovate (or nearly quadrangular when lobed), shallowly cordate, short-acuminate and cuspidate; nectary near base of midvein only, very small but sharply defined, narrowly deltoid; pulvinus red-brown. Involucel red-brown, the bractlets distinct, ovate, subcordate, rather shallowly several-toothed, the teeth lance-subulate, setaceous-tipped; a small nectary at base of each bractlet, often deeply colored or black. Calyx shallowly dentate with short, subulate, almost acicular teeth; oil-glands fairly numerous. Corolla about twice as long as the involucel, broadly campanulate; petals deep rose-red with large dark-red, Sturtii-like spots. Column elongate. Filaments and connectives purple. Pollen cream. Stigmas well-exserted, with few oil-glands.

hirsutum x Sturtii. F<sub>1</sub>

(Riverside, September 17, 1936)

W 82 (3 plants). Resembles hirsutum (Red Acala) x Sturtii (W 81) but bark greenish, foliage dark green (sometimes purplish on veins, pulvinus and margins), involucls green or tinged with purple, calyx teeth longer. Two plants have nearly spotless petals and the third has petals with large spots. The filaments, but not the connectives, are purplish in one of these plants.

W 139 (1 plant) is similar to W 82. It has large, Sturtii-like petal spots and cuspidate leaf-lobes.

hirsutum x thespesioides (Thurberia), F<sub>1</sub>

(Riverside, September 16, 1936)

W 44 (1 plant). Stem stout, erect with numerous, ascending or nearly horizontal branches. Bark (young and old) reddish brown. Plant obscurely and sparsely stellate-puberulent, at least on the young parts. Leaf blades large, thickish, firm, dark green (much as in barbadense), the larger ones deeply 5-lobed, with oblong-ovate, long-acuminate lobes, rather deeply cordate with a nearly closed basal sinus; nectary near or considerably above base of midvein only, large, deltoid; pulvinus dull brown. Bractlets separate, cordate-ovate, deeply cleft (to below middle), with numerous lanceolate, setaceous-acuminate teeth; a large, often dark-colored nectary at base of each bractlet. Calyx shallowly crenate with broadly deltoid, obtuse teeth; nectaries none. Corolla about 35 mm. long, much surpassing the involucre, open-campanulate; petals nearly white, fading pink, spotless. <sup>1/</sup> Filaments rather long. Pollen pale orange. Stigmas well-exserted, with black oil-glands.

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<sup>1/</sup> The thespesioides parent individual had spotless petals.

hirsutum x tomentosum, F<sub>1</sub>

(Riverside, September 18, 1936)

W 29. Stem erect, very stout, with ascending limbs and spreading fruiting branches. Whole plant whitish tomentose, the hairs short but longer than in tomentosum. Bark green tinged with reddish brown. Leaf blades nearly quadrangular in outline, deeply cordate with a very narrow or closed basal sinus, rather deeply 5-lobed with ovate, acuminate lobes, these often undulate or slightly toothed; pulvinus dull brown; nectary near base of the midvein only, very small for so large a leaf. Bractlets broadly ovate, deeply cordate, slightly connate, deeply dentate with numerous, deltoid-lanceolate, setaceous-acuminate teeth; nectaries at base of 2 or all 3 bractlets, small but distinct. Calyx very shallowly crenate with broadly deltoid, obtuse or acutish teeth; oil glands much as in hirsutum. Corolla not greatly surpassing to twice as long as the involucl, campanulate; petals light yellow (paler than in tomentosum), spotless. Filaments rather long, white. Anthers and pollen pale yellow. Stigmas short but well-exserted.

hirsutum (Red Acala?) x tomentosum, F<sub>1</sub>

(Riverside, September 18, 1936)

W 80 (3 plants). Densely tomentose with very short pubescence like that of tomentosum. Bark reddish brown to nearly black. Leaves darker green than in tomentosum and tinged with dark red, pulvinus and veins pinkish. Leaf blades rather shallowly 5-lobed, with broad, ovate, short-acuminate lobes, deeply cordate at base with a very narrow or closed basal sinus; a very small but sharply defined nectary near base of the midvein, only, sometimes wanting. Bractlets reddish, separate or nearly so, broadly ovate, deeply cordate, rather shallowly toothed on nearly the whole margin, with lance-deltoid, setaceous-acuminate teeth; a small but well-defined nectary at base of 2 or all 3 of the bractlets. Calyx with very shallowly crenate margin, the teeth broad, rounded or acutish; oil glands rather numerous, black; nectaries present, but perhaps non-functional. Corolla campanulate, not much surpassing the involucrel; petals pale yellow (much paler than in tomentosum), deeply tinged with red where exposed, slightly glossy, spotless. Column elongate. Filaments rather long. Anthers ochroleucous. Pollen cream. Stigmas well-exserted but much shorter than the column. Bolls 3-lobed, narrow, tapering to a sharp point or abruptly short-acuminate, not pitted but with conspicuous, black oil glands.

Manking x thespesioides, F<sub>1</sub>

(Riverside, July 13, September 17, 1936)

W 79. Stem tall, with the larger branches ascending. Plant glabrous except on the young parts, which are somewhat puberulent. Bark brown, nearly black on young twigs. Leaf blades deeply and narrowly 3- to 5-lobed, with oblong-lanceolate, acuminate lobes, with a shallow, open basal sinus; pulvinus and principal veins light brown; nectary near base of midlobe, only, very small. Involucrel small, barely 2 cm. long, the bractlets separate to the base or united very near the base, somewhat truncate at apex, cordate-ovate, rather deeply 5-toothed but not cleft to the middle; nectaries at base of all 3 bractlets. Calyx with undulate margin, numerous, but inconspicuous, oil-glands, and no nectaries. Corolla about twice as long as the involucrel, rotate-campanulate (Thurberia-like), nearly white (pink where exposed in bud), with well-developed spots (grade 7)<sup>1/2</sup>; petals shallowly erose. Pollen orange (cadmium?). Stigmas short but exserted.

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<sup>1/2</sup> The thespesioides parent was a spotless individual.

purpurascens x tomentosum, F<sub>1</sub>

(Riverside, July 13 and September 17, 1936)

W 95. Plant tall, with numerous, suberect branches. Bark nearly black. Leaves (especially the pulvinus and veins) and involuclers more or less purple (color less intense than in purpurascens). Leaves and young stems soft-pubescent (less so than in tomentosum). Leaf blades deeply 5-lobed, with oblong-ovate, acuminate lobes, deeply cordate at base with a narrow basal sinus, copiously black-punctate; nectary (usually present) near base of the midvein only, small and often ill-defined, sometimes slightly elongate. Bractlets long and narrow, slightly connate, oblong-ovate, with few, long, lance-subulate, setaceous-acuminate teeth; a well-defined nectary at base of 2 or all 3 bractlets. Calyx margin entire or undulate; oil glands numerous, black. Corolla clear yellow (lighter than in tomentosum and not glossy), spotless. Stamens with long filaments. Pollen yellow, of very nearly the same color as the petals. Stigmas very long, equalling or longer than the column, with numerous black oil glands. Bolls 3- or 4-loc, slender, short-acuminate (not sharply so) or sharply long-acuminate, the surface pitted. Seeds densely covered with long brown fuzz. Lint short but fine, brownish.

sanguineum x anomalum, F<sub>1</sub>

(Riverside, September 17, 1936)

W 27 (1 plant). Plant tall, open, with ascending branches. Young bark nearly black, old bark brown. Branches and petioles hirsute. Leaf blades glabrate above, rather long-stellate pilose on the margins and lower surface, with many long, simple, flaccid hairs on the principal veins beneath and on the petioles, a few on the margins, very deeply 5-lobed with narrow, acuminate lobes; basal sinus shallow and open; pulvinus dull brown; nectary at base of midlobe only, very small. Bractlets separate and distant, ovate-oblong, truncate, 3-cleft very deeply (to the middle or lower), with lanceolate, setaceous-acuminate teeth; occasionally with 1 or 2 very short additional teeth; nectaries at base of 2 or all 3 of the bractlets. Calyx strongly nerved (anomalum character), 5-dentate with rather long deltoid-subulate teeth; nectaries none; oil glands few. Corolla about 35 cm. long, considerably surpassing the involucrel; petals deep rose shading to whitish just above the large, very dark red (nearly black) spots. Column rather long. Pollen orange. Stigmas considerably exserted. Bolls 4-lobed, slender, 4-angled, sharply long-acuminate, 30-35 mm. long, rather deeply few-pitted (not verrucose as in anomalum).

Resembles in vegetative characters the sanguineum parent, but as compared with the latter, the leaves are much more deeply lobed, with more acuminate lobes, and are much less highly colored, the hybrid being intermediate in this last character. The hybrid also has a very different involucrel, that of sanguineum being dark brown-purple with strongly connate, broad, subcordate-deltoid, acute bractlets which are entire or very shallowly 2-toothed near the apex.

sanguineum x Stockii, F<sub>1</sub>

(Riverside, July 13 and September 17, 1936)

W 99 (2 plants). Old bark light-brown or nearly white, young bark nearly black. Branches numerous, wide-spreading or somewhat drooping. Twigs, petioles and leaf-blades pilose with short, stellate hairs. Leaves on the main stem and lower branches 2 to 4 times as large as the upper leaves, the latter only 25 to 35 mm. long and wide. Leaf blades broader and with more spreading and broader lobes than in sanguineum, the lobes often 1-cleft, less often several-cleft; nectary near base of midlobe, very small. Involucels purplish brown, the bractlets separate, cordate-ovate, rather deeply toothed on nearly the whole margin, the teeth 10 to 12, lance-subulate, setaceous-acuminate; a nectary at base of each bractlet. Calyx shallowly dentate with deltoid, acute teeth; nectaries none; oil-glands very few. Corolla (30 to 35 mm. long in September) about 1½ times as long as the involucl, campanulate-funnelform, deep rose with fairly large and intense, pomegranate-purple spots. Stamens numerous, with purplish-margined connectives. Pollen deep cream. Stigmas short but exerted.

Differs from sanguineum in the less rigid branches, broader leaf-blades with broader and more spreading lobes, and very different involucels (see description of latter under sanguineum x anomalum, F<sub>1</sub>).

*Dr. ...* *latent*  
Gossypium, Interspecies Hybrids, F<sub>1</sub>  
Rubidoux Laboratory, Riverside, July-September, 1934.

barbadense x harknessii

W 36 (2 plants) and W 38 (2 plants). All of these are much alike and show more barbadense than harknessii characters.<sup>1/</sup> Plants large (up to 10 feet high) and limby, with long fruiting branches and vegetative branches at many of the upper nodes. Stems decidedly woody, twigs reddish-brown. Petioles less densely puberulent than in harknessii, with longer hairs. Leaf blades barbadense-like but smaller, the larger ones deeply 5-lobed, puberulent, especially on the veins, with short, stellate hairs, with a deeper-colored pulvinus than in barbadense and with a small deltoid or lanceolate nectary on the midvein towards base. Involucel large, hirsutum-like, showing no sign of falling at anthesis, the bractlets deeply lacinate with broad teeth, separate or nearly so. Flowers much larger than in harknessii. Calyx ciliolate, with undulate margin and numerous black oil glands. Petals pale green-yellow (V)<sup>2/</sup> in W 36, between <sup>W</sup>Martins yellow and picric yellow (IV) in W 38, the spots large but rather faint. Filaments purplish. Anthers light cadmium (IV), their connectives not colored or occasionally with a few purple oil glands bordering the anther cell. Pistil (exserted portion) equalling or surpassing the stamiferous portion of the column. Oil glands of the very young bolls reddish brown. The two last characters apparently are derived from harknessii.

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<sup>1/</sup> It appears that, in crosses with G. harknessii, barbadense is more "prepotent" than hirsutum (see harknessii x hirsutum).

<sup>2/</sup> The Roman numerals in parentheses refer to the plates in Ridgway.

Gossypium, Interspecies Hybrids, F<sub>1</sub>  
Rubidoux Laboratory, Riverside, July-September, 1934

barbadense x punctatum

W 53 (2 plants) and W 54 (1 plant). Plants much as in barbadense x hirsutum F<sub>1</sub>, nearly glabrous except on the very young parts. Petals approximately Martini<sup>4</sup> yellow (IV), with rather faint, striate spots. Filaments not colored. Pollen between apricot yellow and light cadmium (IV) in W 54, near empire yellow (IV) in W 53. Pistil (exserted portion) short in comparison with hybrids between armourianum (or harknessii) and cultivated American cottons. Bolls 3-5 lock, their surface smooth and light-colored.

barbadense x schottii <sup>3/</sup>

W 46 (2 plants) and W 49 (2 plants). Plants glabrous or nearly so except on the very young parts. Stems dark purple. Leaf blades (larger ones) deeply and narrowly 5-lobed but not more so than in barbadense, much less so than in typical schottii. Flowers very like those of barbadense x hirsutum F<sub>1</sub>. Involucrel of intermediate character. Calyx with merely undulate margin and many oil glands. Petals pale green-yellow (V) with fairly pronounced spots. Filaments not colored. Pollen between empire yellow and lemon-chrome (IV). Bolls mostly 4-lock, pointed, rather deeply pitted, with short but pronounced apical furrows.

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<sup>3/</sup> The "G. schottii" parent is probably a hybrid with some other form, having less incised leaves than schottii.

Gossypium, Interspecies Hybrids, F<sub>1</sub>  
Rubidoux Laboratory, Riverside, July-September, 1934

barbadense x sturtii

W 33 (4 plants) and W 57 (3 plants). All of these plants are much alike in corolla characters but show more variation in the characters of the leaves, involucre and calyx than the individuals of any other interspecies combination. Plants glabrous throughout or very nearly so, large, up to 11 feet high, resembling sturtii in their rather stiff habit, with long, nearly erect vegetative branches. <sup>4/</sup> Fruiting branches with very long internodes. Young bark reddish brown (green in sturtii), glaucous (as in sturtii). Leaf blades not glaucous, from rather light to dark green with a dark brown pulvinus, sometimes pronouncedly crinkle-margined (W 33 A), the larger ones varying, on different plants, from deeply and rather narrowly 5-lobed to much more shallowly and broadly 3-lobed, with large, lanceolate or deltoid nectaries at the base of the midvein or (in some of the plants) of all 3 principal veins. Stipules long and narrow, clustered at the ends of the branches, as in sturtii. Involucre glabrous, 1/2 to 2/3 as high as the corolla, the bractlets separate to the base, more or less deeply lacinate with few or rather numerous subulate, setose-tipped teeth, with a nectary at the base of one or more of the bractlets. Flowers very large and handsome. Calyx ciliolate, with numerous oil glands, sharply dentate, the deltoid-subulate teeth varying in length on different plants, often as long as the height of the undivided portion. Petals densely ciliate towards base, between Tyrian pink and rose-color (XII) with very large, intense, feathered spots of sturtii character (pin-wheel effect) and varying from pomegranate-purple to Bordeaux (XII) in color. Column very long and stamiferous nearly to its base, as in sturtii. Filaments purple. Anthers reddish. Pollen yellow. Pistil long-exserted but the exserted portion much shorter than the stamiferous part of the column.

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<sup>4/</sup> But differ from sturtii in their much more open habit, fewer stems and long, lignified, but thin branches with very long internodes. The first internode often 1 foot long.

Gossypium, Interspecies Hybrids, F<sub>1</sub>  
Rabidoux Laboratory, Riverside, July-September, 1934

contextum x armourianum

W 56 (2 plants). Very similar to hirsutum x armourianum in all characters. Leaf blades quadrangular in outline, the larger ones shallowly 3-lobed with short-acuminate lobes, nearly glabrous, with a very small nectary on the midvein towards base. Involucel with the bractlets widely separated, oblong, narrowed at base, very deeply lacinate with a few narrowly lanceolate or subulate, setose-tipped teeth that equal in length the undivided portion of the bractlet. Calyx dentate with deltoid-setose teeth nearly or quite as long as the height of the undivided portion, and with very numerous oil glands. Petals lighter than Martine<sup>IV</sup> yellow (IV) tinged with red on the exposed portion and fading rose-color (XII), the large, rather intense spots pomegranate-purple (XII). Filaments, at least the lower ones, purple. Pollen light cadmium (IV). Pistil (exserted portion) very long, equalling or longer than the stamiferous portion of the column.

contextum x hopi

W 26 (3 plants). Young stems, petioles and peduncles hirsute. Leaf pulvinus liver-colored. Petals spotless, pale green-yellow (V). Pollen between baryta-yellow and pinard yellow (IV). Bolls, lint and the nearly naked seeds much as in G. hopi.

Gossypium, Interspecies Hybrids, F<sub>1</sub>  
Rubidoux Laboratory, Riverside, July-September, 1934

contortum x schottii <sup>5/</sup>

W 51 (2 plants). Stems and <sup>pedicels</sup> ~~petals~~ very dark purple, this color (schottii character) showing also in the leaf veins and involucels. Leaf blades deeply and narrowly lobed. Petals spotless, lighter than ~~Martini~~ yellow (IV). Anthers (pollen ?) approximately empire yellow (IV). Bolls 4-lobed, somewhat taper-pointed, very smooth, with short but pronounced apical furrows.

daivisonii x sturtii

W 59 (1 plant). Plant very open, with few ascending branches, intermediate in the angle of the branches but very different from either parent in having very few branches, obscurely puberulent towards the apex of the petiole, on the pulvinus and near the base of the leaf veins, otherwise glabrous or very nearly so. Twigs reddish but less so than in daivisonii (green in sturtii), glaucous, older bark grayish brown. Leaf blades glaucous but much less so than in sturtii, all entire or occasionally with a very short tooth, broadly ovate, short-acuminate (abruptly apiculate in sturtii), subcordate. Involucel nearly intermediate, about 1/2 as high as the corolla, obscurely ciliolate, otherwise glabrous, the bractlets quite separate, oblong-ovate, with a few short, deltoid, setose-tipped teeth. Calyx dentate with deltoid, obtuse to setose-acuminate teeth and with fairly numerous oil glands. Corolla small, about 1 1/2 inches high. Petals pale rhodonite pink (XXXVIII), the spot sturtii-like, pomegranate-purple (XII). Column much as in sturtii, long, the stamiferous portion longer than the exerted part of the long-exserted pistil. Filaments short, purplish. Anthers pale orange-yellow (III) drying pinkish. Pollen pale yellow.

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<sup>5/</sup> See footnote under barbadense x schottii.

Gossypium, Interspecies Hybrids, F<sub>1</sub>  
Rubidour Laboratory, Riverside, July-September, 1934

harknessii x armourianum

W 41 (2 plants). No flower buds have appeared to date (Sept. 8). Much like harknessii in general appearance but plant more open and with more ascending branches than either parent. Obscurely puberulent on the very young parts, soon glabrous. Twigs more highly colored than in either parent, light mahogany colored, older bark light brown. Leaf blades grayish green (yellowish in harknessii, deeper green in armourianum), less shiny above than in armourianum, nearer harknessii in size and shape, entire to very shallowly 3-lobed with rounded lobes (similarly but less deeply than in harknessii), broadly ovate, obtuse or scutish, rather deeply cordate. (Flower characters noted Sept. 17, 1936.)

herbaceum x neglectum

W 43 (3 plants). Plants large for Asiatics (heterosis effect?). Bark coffee-colored, that of the older stems nearly black, twigs, petioles and peduncles hirsute, the petioles more so than in herbaceum, less so than in neglectum. Leaf blades much nearer neglectum in shape. Involucel brown, resembling that of neglectum in its more triangular bractlets with slenderer, more setose teeth, the bractlets connate near base. Calyx more like that of herbaceum in its relatively inconspicuous oil glands and undulate or very short-dentate margin, the teeth deltoid and not (as in neglectum) setose-tipped. Petals approaching neglectum in size and shape (longer and narrower than in herbaceum) and in the much larger size of the very intense and solid spot, colored, as in both parents, between Martins yellow and picric yellow (IV), the spot between carmine and ox-blood red (I). Anthers light cadmium (IV). Bolls mostly 4-lock, short-ovoid, very plump, abruptly pointed, somewhat pitted, with long, deep apical furrows, red where exposed.

Gossypium, Interspecies Hybrids, F<sub>1</sub>  
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hirsutum x armourianum

W 34 (3 plants) and W 43 (3 plants). Plants glabrous except on the very young parts, large, woody, many-stemmed but open, the branches wide spreading, with long internodes, the branchlets conspicuously zigzag. Bark of twigs reddish-brown, of older branches light brown. Leaf blades light green with a small brown pulvinus, mostly shallowly 3-lobed. Petioles about equalling the blades. Involucel persistent after anthesis, the bractlets separate and with few long teeth. Calyx as in contextum x armourianum or with shorter teeth. Petals pale green yellow (V) or <sup>11</sup>Martins yellow (IV), reddish on the exposed edges, with or without spots that are faint and striate to rather intensely pomegranate-purple (XII). <sup>6/</sup> Filaments colorless or the lowest purple. Anthers with or without red color on the connective. Pollen light cadmium (IV). Exserted portion of the pistil very long (armourianum character).

Very similar in all characters to contextum x armourianum (W 56).

hirsutum x barbadense (Pima)

W 50 (2 plants). Typical of the combination in F<sub>1</sub>. Flowers and bolls very large. Petals near <sup>11</sup>Martins yellow (IV), with rather faint, striate spots. Pollen empire yellow (IV).

hirsutum x barbadense <sup>6/</sup>~~armourianum~~? (Brown Mohaux 204 A)

W 25 (2 plants). Plant A has pale green-yellow (V) petals with very faint or no spots, empire yellow (IV) pollen, long, pointed bolls and brown lint. Plant 1 has white lint, consequently either the ♂ parent was heterozygous for lint color or plant 1 was really from a cross with CB 204B (White Mohaux).

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<sup>6/</sup> The armourianum parent of W34 and W 43 was presumably heterozygous for this

Gossypium, Interspecies Hybrids, F<sub>1</sub>  
Rubidoux Laboratory, Riverside, July-September, 1934

hirsutum (Acala) x punctatum

W 47 (3 plants). Plants hirsutum-like in all characters, sparsely hirsute on the young stems and petioles. Petals very pale yellow, anthers pale yellow as in punctatum. Bolls 4-5 lock, large and plump, short-pointed or nearly pointless, with or without very short apical furrows.

Gossypium, Interspecies Hybrids, F<sub>1</sub>  
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sanguineum x (obtusifolium) *apricanum*

W 45 (3 plants). Young stems, petioles and peduncles very hirsute. Bark dark brown when young, becoming nearly black. Leaf blade more like that of sanguineum (CB 787) than herbaceum, deeply lobed, with relatively narrow, acuminate lobes; but the lobes are broader than in sanguineum and are more or less contracted at base (herbaceum character). The hybrid has a very small nectary on the midvein towards base, a character not noted in sanguineum nor in obtusifolium CB 749 but present in obtusifolium CB 419, the ♂ parent of this hybrid. Involucel like that of sanguineum in having bractlets of more triangular shape but they are rather deeply lacinate with setose-tipped teeth as in obtusifolium, while in sanguineum they are merely denticulate. Calyx resembling both parents in <sup>having the margin merely</sup> ~~its~~ indulate or <sup>with</sup> very short and broad teeth. Involucel and calyx both showing a diluted condition of the reddish color conspicuous in sanguineum but lacking in obtusifolium. Petals ruffled on the outer edge, nearly as large as in obtusifolium (much larger than in sanguineum) approaching the latter in their prevailing color, which is pomegranate-purple (XII) (yellow in obtusifolium) but shading to yellowish around the spot rather than, as in sanguineum, to whitish. Spot solid and intense, Bordeaux color (XII) intermediate in size relative to that of the whole petal (relatively much larger in sanguineum). Column much as in sanguineum (more elongated than in obtusifolium). Anthers near xanthine-orange (III) as in obtusifolium (purplish in sanguineum). Bolls mostly 3-lock, oblong-ovoid, short-pointed, smooth, reddish where exposed.

The characters of both parents are about equally represented in the hybrid.

Gossypium, Interspecies Hybrids, F<sub>1</sub>  
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sturtii x armourianum

W 40 (1 plant). No open flowers have been produced to date (Sept. 8). Plant minutely puberulent on the very young parts, soon glabrous, low, about 3½ feet high, compact, with very numerous, ascending branches, much lower and more spreading than sturtii but with fewer and less spreading branches than armourianum. Twigs and petioles partly reddish (more so in armourianum, green in sturtii), glaucous. Leaf blades not glaucous and of about the same color as in armourianum but thinner and less shiny above, much larger than in armourianum, broadly ovate, subcordate, abruptly short-acuminate with a cartilaginous tip (this more pronounced in sturtii), usually with a small slit-like nectary near the base of the midvein. Involucre of intermediate size and character, more persistent than in armourianum, the bractlets widely separate, narrowly lanceolate, entire, or occasionally with a minute tooth near apex, very sharply cartilaginous-acuminate. Calyx conspicuously dentate with deltoid-subulate teeth, these longer and slenderer than in armourianum, and with numerous, conspicuous and prominent black oil glands.

Gossypium, Interspecies Hybrids, F<sub>1</sub>  
Rubidoux Laboratory, Riverside, July-September, 1934

sturtii x harknessii

W 35 (3 plants), W 39 (3 plants) and W 52 (2 plants). Plants all very similar, of intermediate habit, less stiff and erect than sturtii<sup>2/</sup> but much less spreading than harknessii, more open than either parent,<sup>3/</sup> with numerous erect or ascending branches, nearly glabrous. Twigs reddish brown, glaucous, older bark pale brown. Petioles obscurely puberulent towards apex. Leaf blades glaucescent, nearer harknessii in color, broadly deltoid, entire to rather deeply 3-lobed (much more so than in harknessii), subcordate, acuminate, the lateral lobes rounded or acute, with a very small, slit-like nectary near the base of the midvein. Stipules conspicuously clustered at the ends of the branches, as in sturtii. Involucel more persistent than in harknessii, larger than in either parent, 1/2-3/4 as high as the corolla, glabrous, the bractlets widely separate, ovate or lance-ovate, setose-acuminate, narrowed at base, usually undulate or sparsely denticulate on the margin, but sometimes dentate with very few, short or long, subulate-setose teeth, usually 1 or 2 of them with a nectary at base. Calyx very thin, obscurely ciliolate, dentate with short, deltoid, very acute teeth and with numerous oil glands. Petals 1-2 inches long, of a rather dingy color between rose pink (XII) and hellebore red (XXVIII), with a broad, pinkish buff stripe on the exposed edge, the spot large, much like that of sturtii in shape but less feathered, bright carmine (I). Column often very long, as in sturtii. Filaments much shorter than in harknessii. Anthers between dragon-blood red (XIII) and Etruscan red (XXVII), the connectives usually without oil glands. Pollen pale yellow. Pistil (exserted portion) long but usually shorter than the column.

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<sup>2/</sup> W 35 plant A more nearly resembles sturtii in habit than the other plants.

<sup>3/</sup> Much more open and fewer-branched than sturtii x armourianum (W 40).

Gossypium, Interspecies Hybrids, F<sub>1</sub>  
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Thurberia thespesioides x G. sturtii

W 58 (2 plants). Plants tall (one 10 feet high), much more open in habit than sturtii, with numerous, nearly erect limbs, some of which are borne high on the plant, the young branches somewhat glaucous. Stipules long, subulate, clustered at the ends of the branches. Leaf blades green, slightly glaucous, much like those of Thurberia in shape, ovate-lanceolate and entire to deeply and narrowly 3-lobed, <sup>9/</sup> the lobes long-acuminate, <sup>10/</sup> setose at apex as in sturtii (but not in Thurberia), with an elongate, slit-like nectary very near the base of the midvein, <sup>11/</sup> Involucel with bractlets widely separate, as in both parents, bractlets lanceolate, intermediate in width but near sturtii in length, setose-tipped (as in sturtii) often with 1 or 2 setose teeth, <sup>12/</sup> usually with nectaries at the base of all 3 bractlets (as in Thurberia but not in sturtii). Calyx abruptly dentate with subulate-setose teeth. <sup>13/</sup> Petals approaching those of sturtii in size and shape, in color intermediate between white and pale amaranth pink (XII), <sup>fading to the latter color,</sup> the spot between pomegranate-purple and Bordeaux (XII), very like that of sturtii but occupying somewhat <sup>a larger proportion</sup> ~~more~~ of the area of the petal. Column much as in sturtii, elongate, with short filaments but with fewer stamens and these not extending so near the base of the column. <sup>14/</sup> Filaments purple. Anthers daphne pink (XXVIII). <sup>15/</sup> Pistil (exserted portion) long but not squalling the column. <sup>16/</sup>

<sup>9/</sup> In Thurberia sometimes 5-lobed.

<sup>10/</sup> Abruptly apiculate in sturtii.

<sup>11/</sup> In Thurberia the nectary is broader and lanceolate, while in sturtii, when present, it is similar to that of the hybrid.

<sup>12/</sup> Such teeth are occasional in Thurberia, although not in our specimens. In sturtii the bractlets are (always?) entire.

<sup>13/</sup> In sturtii the teeth are shorter and broader, in Thurberia the calyx margin is obscurely dentate with broad, obtuse teeth.

<sup>14/</sup> In Thurberia the column is much shorter and the filaments are much longer.

<sup>15/</sup> In Thurberia the anthers are green-color and filaments pale yellow.

<sup>16/</sup> In Thurberia the pistil is little exserted.

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GOSYPTIUM HYBRIDS (F<sub>1</sub>) RIVERSIDE, CALIF.

Row 6 (Outside Field)

W 41, harknessii x armourianum, plant A. No flowers yet. Leaves more like those of armourianum but rather large for that species and with a slight indication of lobation. See also Row 5, inside.

W 39, sturtii x harknessii, plants A, B and C. Plant A is intermediate in the degree of glaucousness of the stems (and leaves?). Leaves mostly more or less 3-lobed, some of them much more deeply and acutely so than in harknessii. Stipules conspicuously clustered at the ends of the twigs, as in sturtii. Involucel almost intermediate. No open flowers today. Plant B has the involucel very large in proportion to the corolla, about 5/4 as high, bractlets entire but abruptly acuminate, as in harknessii. Petals a rather dingy rose-pink with a bright carmine spot, much like that of sturtii in shape, but more solid. Column long with stamens nearly to the base, as in sturtii. Plant C is similar.

W 38, sturtii x harknessii, plants A and B. Both plants resemble W 39 in their leaves and involucel. Neither has open flowers today. See also Row 5, inside.

GOSYPIUM HYBRIDS ( $F_1$ ) RIVERSIDE, CALIF.

Row 6 (Outside Field) Cont'd.

W 52, sturtii x harknessii, plants A & B. No open flowers today. Plants similar to W 39 and W 35 in leaves and involucl. All of these sturtii x harknessii plants resemble the latter in their spreading habit and in the color of the leaves and twigs, the latter being reddish-brown, with a bloom.

W 48, herbacum x neglectum, plants A & B. Plants large. Leaves more like those of the staminate parent (neglectum), proving that the plants are true hybrids. See also Row 6, inside.

Row 7 (Outside Field)

W 43, hirsutum x armourianum, plants A & B. Plants with the habit of harknessii, woody, with horizontal, reddish-brown branches, glabrous or nearly so. Leaves mostly 3-lobed. Involucl persistent after anthesis, the bractlets separate and with few, long teeth. Corolla pale yellow, with large but not intense spots (plant A), spotless (plant B). Anthers orange-colored. Stigmas very long. Plant C, in row 8, is similar.

W 47, hirsutum (Acala) x punctatum, plants A & B. Plants hirsutum-like in all characters except that they have the pale yellow anthers of punctatum, the staminate parent. See also Row 5, inside. *growth habit somewhat prostrate like punctatum*

GOSYPIUM HYBRIDS (F<sub>1</sub>) RIVERSIDE, CALIF.

Row 7 (Outside Field) Cont'd.

W 56, confertum x armourianum, plant A. Very similar to W 43 (hirsutum x armourianum) in habit, foliage, involucre and corolla. Petals pale yellow with large but not intense spots. Filaments purplish to the summit. Stigmas very long. See also Row 5, inside.

W 54, hirsutum x armourianum, plants A & B. Very similar to W 43 (same combination). Petals pale yellow. Anthers orange with a carmine-colored "connective." Stigmas very long. Plant A has petal spots varying from very small and faint to large and fairly intense. Plant B has spotless petals. Presumably the armourianum parent of W 43 and W 54 was heterozygous for petal spot. (See also Row 2, inside field).

W 57, barbadense x sturtii, plant C. (see Row 8, outside).

W 50, hirsutum x barbadense (Pima), plant A. Petals pale yellow with rather large but rather faint spots. Anthers yellow. Bells large, <sup>mostly</sup> pointed. (See also Row 2, inside field). *Grass habit more upright like barbadense.*

GOSYPIUM HYBRIDS ( $F_1$ ) RIVERSIDE, CALIF.

Row 7 (Outside Field) Cont'd.

W 51, contextum x schottii, plants A & B. In plant A, the deeply and narrowly lobed leaves and purple color of the stems, leaf-veins and involucels are characters of the staminate parent (schottii). Plant B is very different, much hairier and has very little purple color. It has the petals pale yellow, as in contextum, but with a faint spot, a character not exhibited by either parent (?). The bolls are less pointed (than in plant A ?). See also Row 5, inside. *|| Bolls <sup>narrow</sup> like schottii, mouth like contextum size in point intermediate habit tall & open like schottii*

W 26, contextum x hopi, plants A & B. Petals pale yellow, spotless. Bolls much more like those of the staminate parent (hopi) than of contextum (See also Row 1, inside field).

W 45, sanguineum x obtusifolium, plants A & B. Nearer sanguineum in leaf shape. Corolla (of plant A) rose-red with very large, dark red spots, such as in sanguineum, but the basal region of the petals is pale yellow (approaching the general color in obtusifolium), while in sanguineum it is white. The corolla also resembles that of obtusifolium in its larger size. Plant B has no flowers today. See also Row 6, inside.

GOSYPIUM HYBRIDS ( $F_1$ ) RIVERSIDE, CALIF.

Row 8 (Outside Field)

W 36, barbadense x harknessii, plant A. The plant shows more barbadense than harknessii characters but is decidedly woody, the branches are reddish-brown and the stigmas are very long. See also Row 2, inside.

W 38, barbadense (Pima) x harknessii, plants A & B. Plants very like W 36.

W 53, barbadense x punctatum, plant A. The weak petal spots and the shape and light-colored, smooth surface of the boll are characters showing the influence of the staminate parent (punctatum). The stigmas are short in comparison with those of hybrids involving harknessii and amourianum. (See also Row 2, inside field).

W 54, barbadense x punctatum, plant A. Very similar to W 53.

GOSSYPIMUM HYBRIDS ( $F_2$ ) RIVERSIDE, CALIF.

Row 8 (Outside Field) Cont'd.

W 33, barbadense x sturtii, plants A, B & C. Leaves mostly deeply 3-5-lobed. Characters showing the influence of the staminate parent (sturtii) are the pronounced bloom on the reddish branches, the deep rose-red color of the very large corolla, the feathered, "pin-wheel" appearance of the very dark red petal spots, the very long staminal column and the purplish filaments. Plants B and C have bractlets with fewer and shorter teeth than in plant A. See also Row 2, inside.

W 57, barbadense x sturtii, plants A and B. Plant A has many of the leaves nearly entire and none as deeply lobed as are some of the leaves on W 33, but otherwise resembles the latter. Plant B has the leaves more deeply and narrowly lobed than in any other plant of this combination. Plant C (in row 7, outside) has most of the leaves deeply 3-5-lobed, petals carmine with a darker, sturtii-like spot and a sturtii-like column.

W 37, barbadense x obtusifolium (?), plant A. Shows no characters of obtusifolium but is certainly not typical barbadense. See also row 2, inside.

GOSYPIUM HYBRIDS ( $F_1$ ) RIVERSIDE, CALIF.

Row 8 (Outside Field) cont'd.

W 46, barbadense (Pima) x schottii, plants A and B. The dark purple stems, etc., and the deeply and narrowly lobed leaves are characters of the staminate parent (schottii). The bolls, also, are very like those of schottii. The corolla is pale yellow and spotless, although it should have been weakly spotted if the Pima parent was homozygous spotted. *weakly spotted. Smooth lobed*

W 49, barbadense x schottii, plants A and B. Plant A is Pima-like in all characters. Plant B resembles W 46 and has the purple stems, etc. and the light-colored, smooth boll-surface of the staminate parent (schottii). See also Row 1, inside. *weakly spotted petals, pale yellow color*

W 43, hirsutum x armourianum, plant C. (See Row 7, outside).

W 25, hirsutum x Brown Mohaux, plant A. The yellow corolla, orange anthers and long, pointed bolls are characters of the staminate parent (Brown Mohaux, S. Am. type).

GOSYPIUM HYBRIDS ( $F_1$ ) RIVERSIDE, CALIF.

Row 1 (Inside Field)

W 49, barbadense x schottii, plant 1. The stems are dark purple, as in the staminate parent (schottii).

W 26, contextum x hopi, plant 1. The bolls and seeds are much as in the staminate parent (hopi).

Row 2 (Inside Field)

W 50, hirsutum x barbadense, plant 1. Bolls intermediate. *Bolls same as W50-a outside Row 7.*

W 34, hirsutum x armourianum, plant 1. Very similar to the plants of this number in row 7 (outside field). Petals spotless.

W 53, barbadense x punctatum, plant 1. Very similar to the plants of this number in row 8 (outside field).

GOSYPIUM HYBRIDS ( $F_1$ ) RIVERSIDE, CALIF.

Row 2 (Inside Field) cont'd.

W 59, dauidsonii x sturtii, plant 1. Glabrous or nearly so. Leaves entire, resembling dauidsonii in color. Bractlets much smaller and less deeply lacinate than in dauidsonii.

W 37, barbadense x obtusifolium (?), plant 1. Similar to the plant in row 8, outside.

W 36, barbadense x harknessii, plant 1. Very like the plant in row 8, outside.

W 33, barbadense x sturtii, plant 1. Very like the plants in row 8, outside.

GOSYPIUM HYBRIDS ( $F_1$ ) RIVERSIDE, CALIF.

Row 5 (Inside Field)

W 56, Thurberia x G. sturtii, plant 1. Leaves varying in shape from entire, as in sturtii, to almost as deeply cleft as in Thurberia, deep green in color. Stems somewhat glaucous. Involucel almost exactly intermediate. No open flowers today. See also Row 6, inside.

W 56-1, contextum x armourianum, plant 1. Very like the plants in row 7, outside. Bractlets with few, long teeth. Petal spot well-developed.

W 51, contextum x schottii, plant 1. Resembles plant B in row 7, outside, in showing no apparent characters of schottii.

W 47, hirsutum (Acala) x punctatum, plant 1. The tinge of yellow in the petals and yellow anthers probably derive from the staminate parent (punctatum). See also Row 7, outside.

GOSSEYPTUM HYBRIDS ( $F_1$ ) RIVERSIDE, CALIF.

Row 5 (Inside Field) cont'd.

W 40, sturtii x armourianum, plant 1. A very compact, many-branched little plant with entire leaves. Involucel much larger and more persistent than in armourianum.

W 35, sturtii x harknessii, plant 1. (See also Row 6, outside). Plant much more open and fewer-branched than W 40 (more like harknessii in this respect?). Many of the leaves are shallowly 3-lobed. Bractlets entire, much as in sturtii, about 1/2 as long as the corolla. Corolla and column as in W 39, Row 6, outside.

W 41, armourianum x harknessii (should be the reciprocal?), plant 1. Several of the larger leaves have a slight indication of lobation. No flower buds have developed yet. See also Row 6, outside.

GOSYPIUM HYBRIDS (F<sub>1</sub>) RIVERSIDE, CALIF.

Row 6 (Inside Field)

W 45, sanguineum x obtusifolium, plant 1. Resembles the plants in Row 7, outside. No open flowers today.

W 48, herbaceum x neglectum, plant 1. Resembles the plants in Row 6, outside.

W 58, Thurberia x G. sturtii, plant 1. Resembles the plant in Row 5, inside.

Miscellaneous.

It would seem that, in crosses with harknessii, the characters of barbadense are much more "prepotent" than the characters of hirsutum.

G. stocksii has the bractlets of the involucrel separate and clawed (very unlike the involucrel of cultivated Asiatics) and deeply lacinate. The corolla is very small, about 15 mm. high, the petals nearly white with large but not very intense carmine spots.

G. tomentosum has a brilliant yellow corolla (much like Dendromecon in color) without petal spots. The stigmas are very long and spread at the apex.

Gossypium africanum

(Described from C.B. 419, 435, 436 and 749, at Torrey Pines, Riverside and Palm Springs, 1930, 1931 and 1937. The last number was received as G. nanking sudanensis, the others as G. obtusifolium).

Stems erect, with few, short, ascending vegetative branches and numerous short, spreading fruiting branches. Branches (when young) and petioles copiously villous-hirsute with very long hairs. Bark of young branches green, becoming reddish brown; older bark green with very numerous, light-brown lenticels. Leaf-blades rather copiously soft-pubescent on both faces with short, mostly stellate hairs, and much longer, mostly simple hairs on the veins beneath, yellowish, becoming deep-green above, the veins not colored, rather shallowly 5-lobed, the upper lobes broadly ovate or nearly orbicular, obtuse, acute, or very short-acuminate, often mucronate, the midlobe up to 55 mm. wide, distinctly constricted towards the base, the upper sinuses narrow, rounded at base, partly closed by the overlapping leaf-margins, the basal lobes short, divergent, rounded at apex, often shallowly cleft, the larger <sup>lobes</sup> ~~veins~~ 9 cm. long (measured from the base of the midvein) and 12 cm. wide; basal sinus shallow, broadly triangular, and very open, or very deep and narrow; pulvinus very small, dull brown to bright red; nectary on the midvein only, very small, prominent, short-elliptic, rounded-triangular, or nearly circular. Peduncles very short, ascending or spreading before anthesis, sometimes more or less decurved after anthesis. Involucrel of rather crisp texture, green, sparsely to densely soft-pubescent with stellate hairs; bractlets slightly to very strongly connate, broadly ovate, deeply cordate, 2 cm. long, with 4 to 10 teeth, these very short to long for an Asiatic cotton, setose-acuminate from a broad base; external nectaries rudimentary, or none. Calyx with margin undulate, irregularly

Gossypium africanum, cont'd.

cross, crenulate, or deeply dentate; oil-glands few or rather numerous, conspicuous, black; nectaries usually present at base between the bractlets large, inverted-rounded-delta-shaped, sometimes wanting. Corolla up to 4 cm. long, shorter than to (normally?) twice as long as the involucrel; petals wider than long, pale or bright yellow, conspicuously ruffled, with dark red spots occupying 1/4 to 1/3 of the petal. Column staminiferous nearly to the base, or only on the upper half. Stamens few, or fairly numerous for an Asiatic cotton; anthers near xanthine-orange. Pollen orange. Stigmas not, to considerably, surpassing the stamens. Bolls 3-lobed, (sometimes 3-lobed vertically between the carpels), very small, ovoid, abruptly short-pointed or nearly mucicous, the surface light-green, very smooth, somewhat shiny, with rather conspicuous oil-glands. Seeds densely covered with short, white fuzz. Lint very sparse and short, white.

W14 photographed by Peebles, #156, Riverside, 1936.

Gossypium anomalum

(Described from C. B. 1051 at Palm Springs, 1935, and Riverside, 1936 and 1937)

Stems tall, with rather numerous, ascending branches. Bark of twigs green or brownish, older bark light-brown. Stems (when young), petioles and leaf-blades rather densely soft-pilose with stellate hairs, also villous with fewer, long, spreading, apparently simple hairs. Petioles up to 7 cm. long. Leaf-blades almost tomentose, light yellowish green, deeply 5-lobed (the larger ones), with broadly rounded-ovate, or oblong-ovate, acute lobes, the upper sinuses acute, the larger blades 8.5 cm. long (measured from the base of the midvein) 13 cm. wide; basal sinus deep, narrow, open; pulvinus greenish; nectaries small, but well-defined, on each of the 3 principal veins, well above the base of the corresponding lobe. Peduncles ascending, about 4 mm. long. *cm.?*  
Bractlets separate and distant, narrowly lanceolate, up to 15 mm. long, 4 mm. wide or less, almost entire, or shallowly 3-toothed near the apex; external nectaries at the base of each bractlet, large, rectangular. Calyx deeply 5-cleft with deltoid-subulate teeth 5 to 6 mm. long, strongly ribbed with many (more than 15), thick, prominent ribs; oil-glands few; nectaries none. Corolla about 40 mm. long, funnelform, little expanded at the apex; petals as wide as long, lavender-pink, with large, dark, red-purple spots about 12 mm. long, feathered on the margin. Column staminiferous nearly to the base. Stamens numerous; filaments very short. Pollen cream. Stigmas well-exserted. Bolls 3- or 4-locked, about 20 mm. long, ovoid, abruptly and rather sharply acuminate, pea-green, verrucose with prominent oil-glands.

Gossypium arboreum

(Described from C.B. 618 and 620, Torrey Pines, Riverside and Palm Springs, 1930, 1931, and 1934).

Stems tall, erect, slender, becoming nearly black, these (when young) and the nearly black petioles puberulent and villous. Leaf-blades puberulent or short-pubescent on both faces, rather copiously so on the margins and lower surface, with stellate hairs and with long, simple hairs on the veins, especially beneath, bronze-purple when young, dull dark-green with dull purplish veins when older, small, not much longer than the petioles, very deeply and narrowly 5-lobed, the lobes oblong-lanceolate, acute and mucronate, the basal lobes divergent, often with 1 or 2 very short secondary lobes at base; basal sinus shallow and open; pulvinus purplish; nectary small, usually near the base of the midvein only, but occasionally also on one of the principal lateral veins. Peduncles long, spreading horizontally at anthesis, horizontal or more or less declined, or occasionally erect, after anthesis. Involucel dark purple-brown and stellate-pubescent or puberulent externally; bractlets strongly connate, with 3 or 4 short, broad teeth; external nectaries none, or rudimentary. Calyx shallowly to somewhat deeply dentate with acute teeth, or merely shallowly cleft into broad, truncate lobes; oil-glands few but conspicuous; nectaries at base between the bractlets very large, inverted and rounded delta-shaped. Corolla not or but slightly surpassing the involucel (normally?); petals near amaranth-purple (Ridgway XII), with very large Bordeaux-colored (Ridgway XII) spots. Stamens very few to rather numerous. Bollen near xanthine-orange (Ridgway III). Stigmas short but well-exserted, or fairly long. Bolls 3-lobed, small but finally surpassing the involucel, ovoid, sharp-pointed, sometimes with long

G. arboreum, cont'd.

apical-furrows, the surface light green, becoming dark-purple where exposed, rather deeply pitted. Seeds completely covered with fuzz that is green at first, then brownish. Lint very short, coarse, white.

C. B. 620 photographed by Peebles, #135, at Riverside in 1936.

G. arboreum is described by J. B. Hutchinson (Journ. Genetics 32: 403. 1936) as follows: Leaf-lobes triangular, pointed, not constricted at base; bractlets triangular, longer than wide, enclosing the boll; petals wedge-shaped, longer than wide; bolls tapering, pointed.

Gossypium Armourianum

(Described from C.B. 867 at Riverside, Palm Springs and Sacaton, 1933, 1934 and 1937; also from herbarium specimens from San Marcos Island, Johnston 3645. Published in Journ. Wash. Acad. Sci. 23: 558-560. 1933).

A compact, many-branched shrub  $\frac{1}{2}$ , broader than high, with stem up to 115 cm. long and 2.5 cm. thick at base, with spreading or ascending branches, obscurely granular-puberulent on the very young parts, soon glabrous except the petals, seeds and (sometimes) interior of the capsule (the leaf-blades rarely very sparsely ciliate with short, mostly simple hairs), punctate with slightly prominent brown (drying black) oil-glands on the twigs, stipules, petioles, lower part of midvein on dorsal surface, peduncles, involucrel, calyx, petals, column, exerted portion of pistil and capsules. Bark of twigs reddish and more or less glaucous, older bark light reddish brown. Twigs terete. Stipules caducous, 1.5 to 2.5 mm. long, subulate. Petioles slender, terete, as long as or slightly longer than the blade, usually dark red towards apex. Leaf-blades thick and firm, almost succulent, dark green or yellowish green, shiny on both faces, especially the upper, punctate with imbedded, dark brown oil-glands, rounded-deltoid, not lobed, subcordate or very shallowly cordate, obtuse or acutish and often mucronate at apex, crenulate, palmately 5-veined with the basal pair of veins much smaller, the larger blades up to 3.5 cm. long (measured from the base of the midvein), usually considerably wider (often  $1\frac{1}{2}$  times as wide); basal sinus open, broadly triangular; pulvinus very small, greenish or brownish; nectary on midvein only, near the base, barely 1 mm.

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$\frac{1}{2}$  In its native habitat "a loosely intricate bush 3 feet high and 4 to 5 feet broad" (I. M. Johnston).

G. Armourianum, cont'd.

long, deltoid or lanceolate. Flowers borne, usually singly (sometimes 2), often as if terminally, on usually horizontal branchlets 1 to 4 cm. long, to which the peduncle is articulated. Peduncle without nectaries, stout, subclavate, at anthesis 20 to 40 mm. long and 2 to 4 mm. in diameter at apex, in fruit usually erect and at right angles to the branchlet. Involucel caducous long before anthesis, usually when the bud is 5 to 7 mm. long, leaving very narrow, transverse, brown ridges at the summit of the peduncle; bractlets 3, separate, entire, subulate or narrowly lanceolate, acuminate, 2 to 5 mm. long, less than 1 mm. wide, puberulent, especially on the ventral surface. Calyx 5 to 10 mm. long at anthesis, 5-dentate with triangular or subulate teeth 1 to 2 mm. long, with or without broad, shallow sinis between the teeth; oil-glands numerous, large; nectaries none. Corolla very open-campanulate; petals 25 to 45 mm. long, about equally wide at apex, asymmetrically wedge-shaped, truncate, slightly erose and ruffled on the apical margin, very short-clawed, punctate with (when fresh) orange to dark brown oil-glands, ciliolate towards apex, ciliate towards base, with much longer, often reflexed, white hairs, densely so on the claws where the hairs are 1 to 2 mm. long, pale green-yellow (Ridgway V), often reddish and puberulent on the dorsal surface where exposed in the bud, bearing a pomegranate-purple (Ridgway XIII) spot just above the claw that is 5 to 10 mm. long, asymmetrically wedge-shaped, solid or striate, but sometimes very faint or entirely wanting. Column staminiferous  $1/2$  to  $2/3$  of its length. Stamens numerous; filaments slender, 2 to 4 mm. long, whitish or often purplish, the enlarged summit, where surrounded by the anther cell, carmine or dark purple;

G. Armourianum, cont'd.

anthers inequilaterally reniform, barely 1 mm. long, pale orange. Pollen nearly apricot-yellow (Ridgway IV). Pistil 20 to 25 mm. long above the ovary, the exerted portion somewhat shorter to considerably longer than the column, white, puberulent, conspicuously dotted with prominent, red-brown or nearly black oil-glands, these sometimes crowded at the apex; stigmas erect, closely coherent. Ovules usually 3 per locule. Capsules 10 to 20 mm. high, 3- but sometimes 4-celled, ovoid, abruptly sharp-acuminate with the point 1 to 5 mm. long (rarely pyriform and rounded or merely apiculate at apex), pale green before maturity with a dull or somewhat shiny surface, copiously and conspicuously dotted with prominent dark-brown oil-glands much larger than those of the calyx, the inner margins of the valves sparsely ciliate with long (up to 2 mm.) weak hairs, or sometimes glabrous. Seeds often only 1 but sometimes 2 or 3 per locule, when more than one often strongly connate, 7 to 9 mm. long, rather narrowly obovoid, angulate, rounded-convex on the back, often flat on the inner face or faces, coffee-colored, densely pubescent, at least dorsally, with closely appressed, crispate, pale brown hairs that attain a length of about 4 mm.

The oil (especially that of the green bolls) is bright orange-colored and fragrant, with an odor suggesting that of rose-geranium. In G. harknessii the oil is similarly colored but has a very different odor, peppery rather than fragrant, as is the case also in the cultivated Egyptian cotton (G. barbadense L. ?).

Gossypium brasiliense(?)

(Described from C.B. 351, 495, 523 and 675, Torrey Pines and Riverside, 1930 and 1931. All of these plants had strongly coherent seeds).

Stems glabrous or nearly so. Petioles glabrous or sparsely pubescent and somewhat warty. Leaf-blades very large, sparsely to copiously pubescent beneath and on the pulvinus (and sometimes the larger veins) above, with long, soft, mostly branched hairs, sometimes glabrate, dark-green and more or less shiny above, pale or whitish beneath, thick, firm or rather flaccid, sometimes buckled, very deeply 5-lobed, the three upper lobes elongate, ovate-lanceolate or ovate-oblong, the midlobe often coarsely toothed, the basal lobes triangular-ovate, divergent or slightly reflexed, all of the lobes long-attenuate-acuminate; basal sinus deep, closed 1/2 or less of its length by the overlapping leaf-margins, open-triangular below; pulvinus dull-brown or reddish; nectaries usually on all 3 principal veins near the base, conspicuous but sometimes small, rounded-triangular. Involucel very large, of crisp texture; bractlets separate or somewhat connate, very broad, deeply cordate with few or numerous short to very long, slender or broad teeth. Calyx long, shallowly to deeply crenate or dentate, with obtuse to very acute teeth, the margin sometimes merely undulate; oil-glands numerous; nectaries at base between the bractlets 3, large. Corolla (normally?) not, or but slightly, surpassing the involucel; petals very pale to bright yellow, usually spotless, sometimes with a pronounced spot (grade 6 to 8). Staminal column elongate. Stamens very numerous. Pollen golden- or orange-yellow. Stigmas short or long, usually well-exserted. Bolls 3- or 4-look, long, slender, tapering from near the base to a very sharp, long or short point, dark green, shiny, rough, deeply pitted, with or without pronounced

G. brasiliense(?) cont'd.

apical furrows. Seeds strongly coherent, without fuzz except a small tuft at base and sometimes a little along the raphe and near the apex, the fuzz short, green or greenish. Lint abundant, short, white.

Gossypium brevilanatum

(Described from C.B. 616 at Palm Springs, 1930).

Young stems and petioles quadrangular, the angles scarcely winged, not warty. Petioles about as long as the leaf-blades. Leaf-blades densely and minutely puberulent on the pulvinus and large veins above, very nearly glabrous beneath (unusual distribution of pubescence) deep green and very shiny above with yellowish (not at all reddish) pulvinus and large veins, lighter green beneath, obscurely punctate, deeply 5-lobed, the lobes long-attenuate-acuminate, the upper ones ovate to oblong-ovate, the basal ones ascending, usually strongly so, never reflexed; basal sinus very open, from somewhat narrowly to very broadly triangular; nectary near base of midvein only, short-elliptical to considerably elongate.

Evidently related to G. Kirkii (C.B. 674) but differing in many important characters. This species is discussed by Hochreutiner in Rev. Bot. Appl. 6: No. 64, 1-4. 1926 (in library THK)

Gossypium cernuum

(Described from C.B. 419 and 669, Torrey Pines, Riverside and Palm Springs, 1930, 1931, 1934 and 1937)

Stems erect, slender, with several spreading vegetative branches and numerous, spreading or somewhat drooping fruiting branches. Stems (when young) and petioles densely stellate-puberulent and sparsely villous with simple hairs. Bark of young branches reddish brown and green, becoming nearly black, older bark hazel-brown. Petioles equalling or longer than the blades. Leaf-blades short-stellate-pubescent or puberulent on both faces, with scattered, long, simple hairs on the larger veins beneath, the pubescence persisting on the upper surface chiefly on the larger veins, more extensively beneath, rather dark grayish green, small, deeply and narrowly 5-lobed, the lobes oblong-lanceolate, acute or rather bluntly short-acuminate, the midlobe scarcely, or distinctly, constricted towards base, the upper sinuses very open, truncate at base, the basal lobes divergent, the larger blades 8.5 cm. long (measured from the base of the midvein), 11 cm. wide; basal sinus shallow, open, triangular, or almost none; pulvinus very small, brownish or dull reddish brown; nectaries small but prominent, rounded-triangular, or elliptic, near the base of the midvein and often (smaller ones) on one or both of the principal lateral veins. Peduncles 2.5 cm. long, sharply declined, even at anthesis, the flowers pendent. Involucel obscurely puberulent; bractlets rather firm and crisp, green tinged with bronze-purple, stellate-puberulent, strongly connate, 3 to 3.5 cm. long, with very few, very short teeth near the apex, or entire; external nectaries none. Calyx with entire, or merely undulate,

Gossypium cernuum, cont'd.

margin; oil-glands conspicuous and numerous for an Asiatic cotton; nectaries at base between the bractlets very large, inverted delta-shaped, or rudimentary, or none. Corolla rather large for an Asiatic cotton, 3.5 to 4.5 cm. long, somewhat to greatly surpassing the involucl; petals ruffled at apex, picric-yellow (Ridgway IV),  $\frac{1}{2}$  fading pink, with very large and solid spots, these between pomegranate-purple and Bordeaux (Ridgway XII). Column elongate, stamiferous to the base. Stamens numerous; filaments purplish. Pollen near light-cadmium (Ridgway IV). Pistil 2 cm. long (measured from the base of the column); stigmas short and not surpassing the stamens, or long for an Asiatic cotton, and exserted about 5 mm. Bolls very large and rather long and slender for an Asiatic cotton, very handsome when open, 3- or 4-lock, ovoid, tapering from near the base to a rather blunt point, with long, deep or shallow, apical furrows, the surface pale green, rough, deeply pitted. Seeds small, densely covered with short, greenish white fuzz. Lint very short, white, coarse and wooly.

C.B. 422 photographed by Peebles, #157, at Riverside in 1936.

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$\frac{1}{2}$  white in W15, also received as G. cernuum.

Gossypium contextum

(Described from C.B. 542, Torrey Pines and Riverside, 1931 and 1937).

Stem erect, with numerous, ascending vegetative branches and ascending or spreading fruiting branches. Stems (when young) and petioles villous. Bark of young branches reddish-brown, older bark light-brown. Leaf-blades bright green, rather sparsely villous on the larger veins of both surfaces and elsewhere on the lower surface with long, often simple hairs, deeply 5-lobed, the lobes broadly ovate and rather abruptly acuminate, the upper lobes overlapping at base and sometimes with a coarse tooth, the upper sinuses broad, or narrow and partly closed, the basal lobes divergent, the larger blades 15 cm. long (measured from the base of the midvein), 20 cm. wide; basal sinus rather deep, but usually open; pulvinus conspicuous, reddish brown; nectaries small, nearly circular, towards the base of the midvein and often on one or both principal lateral veins. Involucrel of rather firm texture, nearly glabrous except that the teeth are long-ciliate; bractlets slightly connate, broadly ovate, deeply cordate, 45 to 55 mm. long, with 5 to 7 long broad teeth; external nectaries none, or 1 or 2, nearly circular. Calyx-margin rather deeply and acutely dentate, with one or more of the teeth often elongate, subulate; oil-glands rather numerous, conspicuous; nectaries apparently present, but poorly defined and perhaps non-functional. Corolla open-campanulate; 45 to 60 mm. long, petals nearly white, spotless. Filaments white. Anthers deep cream. Pollen nearly colorless. Pistil 35 mm. long above the ovary, the exerted portion about 2/3 as long as the column. Bolls 4-lobed, nearly spherical, mucous or nearly so, the surface Upland-like. Seeds fuzzless

Gossypium contextum, cont'd.

except for a very small basal tuft of greenish fuzz. Lint white, very short, rather sparse.

G. contextum and G. patens are closely related to the Kearney and Collins series C.B. 396 etc.

Gossypium Darwinii

(Described from C.B. 636, 637, 696, 697, 698, 699, 702, 703, 704, 708, 709, at Torrey Pines, Riverside and Palm Springs, 1930, 1931, 1934 and 1936. A very diverse series, with much variation even within the same C.B. number. Only by comparison with the type of the species could it be determined which of these forms is most nearly typical. The relationship to G. peruvianum is evident).

Plant large, with a strong tendency to arborescent habit. Stem and larger branches usually erect and strict. Bark of young branches reddish brown, dark mahogany-brown, or nearly black, older bark light-brown to very dark-brown. Branches (when young) glabrate, or more persistently pubescent, exceptionally villous. Petioles usually elongate and often nearly or quite as long as the blades, commonly dark-brown or nearly black, usually warty, often conspicuously so, glabrate, or persistently pubescent, sometimes almost tomentose, exceptionally villous, with long, spreading hairs. Leaf-blades glabrate above, or more persistently pubescent above only on the larger veins and pulvinus (rarely elsewhere) usually persistently sparsely to copiously pubescent over most of the surface beneath, the hairs mostly stellate, firm, or rather soft and flaccid, sometimes hanging almost vertically, often more or less buckled or folded below the upper sinuses, the upper surface dark-green (exceptionally grayish or yellowish) and frequently with pinkish or purplish veins, sometimes black-margined, commonly speckled with large and small, dark-brown dots, especially where most exposed to the light,  $\frac{1}{2}$  large, usually deeply but sometimes rather shallowly 5-lobed, the upper lobes oblong-lanceolate to broadly ovate, gradually, or rather abruptly, long-acuminate (exceptionally short-acuminate or merely acute), often

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$\frac{1}{2}$  These dots are usually not evident on the lower surface, and were obscure, or wanting, in some of the plants. Their development appears to be conditioned by exposure, age of leaf, etc.

Gossypium Darwinii

coarsely few-toothed, the midlobe (exceptionally?) constricted at base, the basal lobes short or long, usually divergent but often reflexed, sometimes strongly so, rarely ascending; basal sinus shallow or deep, narrow to broadly triangular, open or frequently closed for part of its length by the (often pronounced) overlapping of the leaf-margins; pulvinus usually large and conspicuous, dull brown to liver-colored, sometimes nearly black, rarely only slightly colored; nectary usually near the base of the midvein only, sometimes on one or both of the principal lateral veins, sometimes wanting, elongate and slit-like or very narrowly and sharply triangular, or small and rounded-triangular to nearly circular. Involucel of crisp texture, conspicuously punctate; bractlets separate or united only very near the base, cordate, with numerous ( $\pm 11$ ), slender, long or rather short teeth. Calyx with margin entire or deeply crenate; oil-glands usually numerous, black. Corolla about 7 cm. long, 2 to  $2\frac{1}{2}$  times as long as the involucel; petals light greenish yellow (Ridgway V) with large, intense spots (about grade 10), these between pomegranate-purple and Bordeaux (Ridgway XII). Column elongate, staminiferous nearly to the base. Stamens numerous; filaments rather short, white. Pollen empire-yellow (Ridgway IV). Stigmas little- or considerably exserted (about 15 mm.). Boll 3-lobed, attenuate to a sharp point, the surface very rough. Seeds partly (or completely?) covered with long, light-brown, reddish-brown, or greenish fuzz. Lint sparse, 12 to 25 mm. long, fine and silky, cream-colored, or pale brown. <sup>2/</sup>

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<sup>2/</sup> The description of the flower, boll and seed characters is based on only a few of the plants.

Gossypium Davidsonii

(Described from C.B. 101 and 860 at Torrey Pines, Riverside, and Sacaton, in 1930, 1931 and 1932. Also from herbarium specimens.)

A much-branched, somewhat straggling shrub with spreading or ascending branches up to 165 cm. long and 6 cm. thick at base, inconspicuously and not prominently punctate, soft-pubescent with short, stellate hairs (densely so when young) on the twigs, leaf-blades, petioles, stipules, peduncles, and involucrel. Bark of young branches usually reddish-brown, older bark light brown or grayish brown. Stipules much more persistent than in Armourianum, 6 to 15 mm. long, 1 mm. wide, linear-lanceolate, acuminate, glandular-punctate. Petioles slender or rather stout,  $1/3$  to  $2/3$  as long as the blade, reddish-brown near the apex. Leaf-blades soft and rather thin, light-green, at first yellowish, above, paler beneath, not shiny, glandular-punctate (inconspicuously so when fresh), with prominent dark brown oil-glands on the veins beneath, ovate or deltoid-ovate, at base truncate to cordate with an open sinus, at apex short- to long-acuminate (sometimes setaceous-tipped), entire or the larger blades often angled or with a large, triangular, obtuse or acute tooth or short lobe on one or both sides, palmately 5- to 7-veined with the basal pair of veins much smaller, the larger blades 5 to 12 cm. long (measured from the base of the midvein),  $2/3$  as wide to considerably wider than long; pulvinus reddish-brown, small but usually conspicuous; nectary conspicuous, circular to lanceolate, near the base of the midvein, Peduncle slender or stout, not noticeably clavate, 1 to 3 cm. long, bearing (usually 3) nectaries, one at the base of each bractlet. Involucrel persistent to maturity of the fruit; bractlets 3, separate, oblong-ovate to broadly ovate, 25 to 35 mm. long,  $1/3$  to  $4/5$  as wide, subcordate to deeply cordate at base and

Gossypium Davidsonii, cont'd.

lacinate with 8 to 10 lanceolate, setaceous-acuminate teeth, the terminal tooth 2/5 to nearly as long as the rest of the bractlet; nectary at the base of each bractlet small and inconspicuous. Calyx 4 to 6 mm. long at anthesis, many-ribbed with short, somewhat prominent ribs, margin entire or undulate; oil-glands very few to numerous, slightly prominent, black when dry; nectaries none. Petals 30 to 45 mm. long, about equally wide near apex, asymmetrically wedge-shaped, obscurely crose and somewhat plicate on the apical margin, short-clawed, stellate-pubescent externally where exposed in the bud, ciliolate (especially on the outer margin) above, ciliate towards base (densely so on the claw), pale greenish yellow (Ridgway V) with a conspicuous, asymmetrically wedge-shaped, usually solid, Bordeaux-red (Ridgway XII), subbasal spot 5 to 7 mm. long. Column about 12 mm. long, staminiferous about 1/2 its length. Filaments slender, 2 to 3 mm. long, light yellow. Anthers 1 mm. long, reniform, cream-colored, the enlarged apex of the filament not (?) red but with a few oil-glands immediately under the anther-cell. Pollen pale yellow. Pistil (above the ovary) 15 to 20 mm. long, the exerted portion shorter than the column, puberulent, pale green, dotted with darker green oil-glands, or white, without conspicuous oil-glands; stigmas often somewhat separate and occasionally slightly recurved. Ovules 6 per locale. Capsule 15 to 25 mm. long and nearly as wide near the base, 4- to 6- (usually 5-) celled, broadly ovoid-conical, scutish to very sharply and abruptly acuminate with points about 3 mm. long, with a dull, pitted or nearly smooth surface, the oil-glands inconspicuous, the margins of the valves sparsely ciliate internally with long, weak hairs. Seeds 3 to 6 per locale, often coherent in 2's to 4's,

Gossypium Davidsonii, cont'd.

6 to 7 mm. long, obovoid, angulate, rounded-convex on the back, flat on the inner faces, striate, coffee-colored when mature, pubescent covered with very closely appressed, crinkled hairs, these greenish at first, then brownish.

The capsules sometimes contain 2 or 3 extra, rudimentary, central cells. The forms from Guaymas, Sonora (C.B. 101) and from La Paz, L.C. (C.B. 860), as represented by plants growing at Riverside, Calif., are similar in all respects except that the former is less pubescent and the leaves are smaller, shorter-acuminate, more distinctly cordate, and more often lobed than in C.B. 860. C.B. 101 also has the seeds longer and less plump than in C.B. 860.

C.B. 101 photographed by Peebles, #165, at Riverside in 1936.

Gossypium Harknessii

(Described from C.B. 861, at Riverside and Palm Springs, 1933, 1934 and 1937, and from herbarium specimens, including the type at U. of C.).

A much-branched shrub, less compact than G. Armourianum, with spreading, ascending, or nearly erect branches, up to 165 cm. long and 6.5 cm. in diameter at base, densely stellate-puberulent on the branchlets, stipules, petioles, peduncles, and calyx, punctate with slightly prominent oil-glands (black when dry) on the same parts as in G. Armourianum. Bark of young branches greenish or reddish brown, older bark brownish gray. Branchlets terete, or nearly so. Stipules caducous, 3 to 6 mm. long, subulate. Petioles slender, terete or nearly so, usually about as long as the blade. Leaf-blades of firm texture, thickish, yellowish green, not or but very slightly shiny, glandular-punctate (obscurely so when fresh), glabrate (granular-puberulent, especially beneath, when young), broadly deltoid in outline, deeply cordate, short-acuminate, or acutish and mucronate, palmately 5- to (usually) 7-veined, in the latter case with the basal pair of veins much smaller, distinctly but shallowly 3-lobed, the midlobe broadly deltoid, one half as long to longer than the remainder of the blade, the lateral lobes very short, broad, rounded or acutish, the margin otherwise entire or nearly so, the larger blades 3 to 6 cm. long (measured from the base of the midvein, usually wider, often much wider than long; basal sinus deep, open-triangular, or narrowed and often closed above; pulvinus very small, greenish or brown; nectary round, triangular, or slit-like, usually (?) less than 1 mm. long, on the midvein only. Inflorescence as in G. Armourianum. Peduncle stout, subclavate, angular and furrowed, at anthesis 5 to 12 mm. long; nectaries none

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1/ In its native habitat "a flat-topped, loosely intricate shrub about 90 cm. high and 100 to 150 cm. broad" (I. M. Johnston).

Gossypium Harknessii, cont'd.

Involucel more persistent than in Armourianum, usually until, or near anthesis; bractlets 3, separate, rather narrowly ovate or oblong-ovate, acutish to acuminate, 10 to 25 mm. long and 7 to 15 mm. wide where widest, truncate or nearly so at base, entire, undulate-margined, denticulate or few-dentate towards apex (the terminal tooth sometimes 1/3 as long as the bractlet), somewhat narrowed and rounded at base, obscurely puberulent or nearly glabrous. Calyx 6 to 8 mm. long at anthesis, undulate- or denticulate-margined; <sup>2/</sup> oil-glands few, inconspicuous when fresh, rather large, greenish; nectaries none. Corolla very open-campanulate, about twice as large as in Armourianum (Palm Springs, 1937); petals 3 to 5 cm. long, light green-yellow (Ridgway V), spotless, much more ruffled than in Armourianum. Column about 17 mm. long. Stamens with the enlarged summit of the filament merely bordered (often interruptedly) with carmine, or without red color; filaments (proper) white, the lower ones 3 mm. long; anthers pale orange. Pollen between apricot-yellow and light cadmium (Ridgway IV). Pistil (exserted portion) longer than the column, white with pale brown oil-glands; stigmas closely coherent, or sometimes slightly separate at apex. Ovules 3 or 4 per locule. Capsule 12 to 20 mm. high, 3- or (usually) 4-celled<sup>3/</sup> ovoid or nearly spherical, apiculate, with points 1-2 mm. long (or sometimes muticous and deeply depressed at apex), the surface (when fresh) dull green, not pitted, with numerous superficial or even slightly prominent oil-glands, the margins

<sup>2/</sup> In dried specimens the calyx, at anthesis, often appears deeply cleft, with broad, truncate or acutish lobes, but on the plant this condition apparently is not reached until the capsule enlarges and ruptures the calyx.

<sup>3/</sup> Occasionally with a fifth small empty cell.

Gossypium Harknessii, cont'd.

of the valves copiously ciliate internally with very slender, soft hairs 2-3 mm. long. Seeds 1 to 4 per locule, when more than one usually strongly connate, 8 to 10 mm. long, broadly obovoid, angulate, rounded-convex on the back, usually flat on the inner faces, conspicuously striate, pubescent as in Armourianum but even more densely so, the hairs usually silvery gray, about twice as long as in Armourianum and Davidsonii, and not so tightly appressed to the seed-coat.

Gossypium herbaceum

(Described from C.B. 521, 729, 731, 735, 742, 743, 745 and 746, Torrey Pines and Riverside, 1930, 1931, 1934 and 1937).

Stem erect, with few or numerous, ascending-spreading vegetative branches, and short, spreading fruiting branches. Bark of young branches green, then reddish brown, finally very dark-brown, older bark light- or grayish brown. Stems, when young, puberulent to rather densely short-pubescent and also more sparsely villous with longer hairs. Petioles similar to the stems in color and pubescence. Leaf-blades pubescent on both faces with very short, mostly stellate hairs and much longer, mostly simple hairs on the veins beneath, deep green, often tinged with bronze, often shiny above, more or less cupped, towards base, little longer than wide, shallowly 5-lobed, the lobes very broadly ovate, rounded, obtuse and often mucronate, or bluntly short-acuminate, the midlobe 35 to 45 mm. wide, somewhat constricted at base, the upper sinuses rounded at base, the basal lobes short and rounded, divergent or somewhat ascending, sometimes slightly cleft, the larger blades 9 cm. long from the base of the midvein, 11 to 13 cm. wide; basal sinus shallow, open, very broadly triangular, or narrowed above; pulvinus small, reddish brown to dark-brown; nectary less than 1 mm. long but sometimes conspicuous, circular, near the base of the midvein only or occasionally on one of the principal lateral veins. Peduncle. at anthesis, 2 to 3 cm. long, erect to slightly (sometimes strongly?) declined, usually deflexed in fruit. Involucrel soft or fairly crisp in texture, sparsely to copiously short-stellate-pubescent, often purplish; bractlets broadly deltoid-ovate, 2 to 3 cm. long, strongly connate, with few or several (up to 9), short, or rather long, broad, triangular-setaceous teeth; external nectaries none to

Gossypium herbaceum, cont'd.

well-developed but apparently non-functional. Calyx about 9 mm. long, the margin merely erose, shallowly crenate with broad, rounded teeth, irregularly dentate or shallowly cleft, with slender teeth; oil-glands few, rather large, black; nectaries 1 to 3, very large, inverted-delta-shaped. Corolla 3 to 4 cm. long; petals ruffled at apex, near Martius-yellow (Ridgway IV), fading rose-red with very large, solid, pomegranate-purple (Ridgway XII) spots, these sometimes occupying 1/5 the area of the petal. Column stamiferous nearly to the base, about 15 mm. long. Stamens few, or rather numerous for an Asiatic cotton; filaments (lower) about 2 mm. long, white, or sometimes purplish. Pollen empire-yellow (Ridgway IV). Pistil with the exerted portion none, or considerably exerted. Bolls 3- to 5-lock, small, but surpassing the involucrel when mature, short-ovoid to nearly spherical, abruptly very short-pointed or almost mucicous, with or without conspicuous and sometimes very long apical furrows, the sides often concave, the surface very smooth, light green, becoming bright-red where exposed, when mature the locks separating near the apex but barely exposing the seed cotton. Seeds densely covered with white fuzz. Lint white.

C.B. 743 photographed by Peebles, #166, at Riverside in 1936.

G. herbaceum is described by J. B. Hutchinson (Journ. Gen. 32: 403. 1936) as follows: Leaf-lobes rounded, blunt, constricted at the base; bractlets rounded or kidney-shaped, wider than long, flaring away from the boll; petals rounded, wider than long; bolls round, or parallel-sided with prominent shoulders.

Gossypium Hopi.  $\frac{1}{2}$

(Described from C.B. 716, Riverside, 1936 and 1937).

Stem, becoming very stout and woody, with ascending vegetative branches and spreading fruiting branches. Bark of young branches green or tinged with red, old bark brownish gray. Stems, when young, and petioles very sparsely pilose. Leaf-blades very sparsely pilose beneath and on the margins, the marginal hairs mostly simple, glabrous above, dark green, firm, about as wide as long, deeply cordate, very shallowly 3-lobed with broadly deltoid, acutish to short-acuminate lobes, the upper sinuses very open or almost none, acutish or rounded at base, the larger blades 12 cm. long from the base of the midvein, 15 cm. wide; basal sinus open; pulvinus conspicuous, liver-colored; nectary near base of midvein small but well-defined. Involucel of rather crisp texture; bractlets strongly connate, broadly ovate, cordate, 4 cm. long, rather deeply cleft with several lanceolate, setaceous-acuminate teeth; external nectaries 3, large. Calyx 5-dentate with deltoid, acute to attenuate-acuminate teeth; oil-glands numerous, black; nectaries appearing as transverse slits. Corolla 4.5 to 5 cm. long, up to 1.5 times as long as the involucel; petals pale yellow, spotless, margin nearly entire. Filaments rather long, white. Pollen pale yellow. Pistil short-exserted.

C.B. 716 photographed by Peebles, #152, Riverside, 1936.

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$\frac{1}{2}$  This description corresponds closely, in most characters, with that of G. punctatum.

Gossypium intermedium

(Described from C.B. 619, Riverside and Palm Springs, 1930, 1931 and 1937)

Stem erect, with numerous, ascending vegetative branches, and short, spreading fruiting branches. Branches, when young, conspicuously and rather densely villous. Bark of young branches green, then reddish brown, older bark light brown. Petioles relatively long, pubescent like the stems, reddish near apex. Leaf-blades puberulent on both faces, ciliate with rather long hairs, villous with long hairs on the veins beneath, deep grayish green above, deeply 5-lobed, the upper lobes oblong-lanceolate, sharply acuminate, the midlobe widest near the middle, distinctly constricted near the base, the basal lobes divergent or somewhat reflexed, acute or short-acuminate, often cleft, upper sinuses rather narrow, rounded at base, the larger blades 8.5 cm. long from the base of the midvein, 9 cm. wide; basal sinus shallow-triangular, or rather deep and narrow; pulvinus greenish; nectaries very small but rather prominent, rounded-triangular, near base of midvein and often on one or both principal lateral veins. Peduncles rather short, erect, spreading, or strongly declined. Involucel soft, pubescent; bractlets slightly to strongly connate, 3 cm. long, with broad teeth that are exceptionally numerous and long for an Asiatic cotton; external nectaries none. Calyx relatively long, deeply dentate with acute to setose-acuminate teeth; oil-glands few, conspicuous; nectaries 3, rather small or large. Corolla 4 cm. long; petals pale yellow, with large, dark-red spots, their margins ruffled (but much less so than in G. africanum C.B. 419). Column stamiferous nearly to the base. Stamens rather numerous.

Gossypium intermedium, cont'd.

Pollen light-orange. Stigmas short, but well exerted. Bolls (not mature), 3-lobed, rounded-triangular (fertilization imperfect?), merely apiculate, the surface pale, shallowly pitted. Seeds completely covered with short, white fuzz. Lint sparse, extremely short, coarse, white.

C.B. 619 photographed by Peebles, #163, Riverside, 1936.

G. intermedium evidently is related to G. arboreum, but has less deeply lobed leaf-blades and lacks the factor for red color in the leaves and petals, except the spots.

Gossypium jamaicense(?)

Described from C.B. 421, 670 and 694, at Torrey Pines, Riverside and Palm Springs, 1930, 1931, 1932 and 1937).

Stem erect, with numerous, ascending-spreading vegetative branches, and spreading, or slightly ascending, fruiting branches. Branches (when young) sparsely villous. Bark of young branches green and reddish brown, older bark light brown. Petioles equalling or longer than the leaf-blades, becoming nearly black, glabrous or very sparsely long-villous, more or less warty (except in C.B. 670). Leaf-blades flat or nearly so, glabrous, glabrate, or sometimes very sparsely long-villous on the veins beneath (rarely somewhat copiously pubescent beneath?), deep-green and somewhat shiny above, shallowly (usually very shallowly) 3- to 5-lobed, when 5-lobed the basal lobes short and often reduced to coarse, divergent teeth, the upper lobes triangular or triangular-ovate, or the midlobe oblong-ovate, abruptly acuminate (sometimes long- and very sharply so, the upper sinuses open, rounded at base, the larger blades 10 cm. long from the base of the midvein, 13 cm. wide); basal sinus shallow or rather deep, narrowed and sometimes closed above, broadly triangular and open below; pulvinus large, conspicuous, liver-colored or nearly black; nectary near base of midvein only, small but sharply defined, circular, rounded-triangular, or narrowly short-elliptic and sharp-pointed distally. Involucel of rather crisp texture; bractlets separate, or nearly so, 4 cm. long, with 7 to 9, rather long and slender, setaceous-tipped teeth; external nectaries 3, well-developed, nearly circular. Calyx with merely undulate or denticulate margin; oil-glands conspicuous, few or rather numerous; nectaries 3, small,

Gossypium jamaicense (L.) cont'd.

crescent-shaped. Corolla 5 cm. long; petals nearly white, with rather large but not intensely colored (grade 5 to 8) spots. Column staminiferous nearly to the base. Stamens numerous. Pollen bright yellow. Stigmas not, or slightly, exserted. Bolls 3- to 5-lobed, small, plump, ovoid, rather abruptly sharp-pointed or nearly mucicous, the surface bright green, conspicuously pitted. Seeds completely covered with long, bright-brown fuzz. Lint very short and sparse, pale-brown. 1/

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1/ Characters of the flowers, bolls and seeds from C.B. 694, only, but the seeds and lint of C.B. 421 were noted as being similar to those of C.B. 694.

Gossypium Kirkii

(Described from C.B. 674, very young plants, Torrey Pines and Palm Springs, 1930).

Plant entirely glabrous except for a few stellate hairs on the pulvinus above. Stems (when young) and petioles quadrangular, narrowly winged, the wing margins conspicuously warty. Leaf-blades shorter, often much shorter, than the petioles, very shiny and rich green with reddish-brown veins above, paler beneath and copiously dotted with small black oil-glands, conspicuously buckled, wider than long, deeply 5-lobed and sometimes with 2 additional very short, deflexed basal lobes, the upper lobes ovate-oblong, strongly acuminate, the basal lobes relatively long, divergent or somewhat reflexed; basal sinus from broadly triangular to deep and narrow but always open; pulvinus reddish-brown; nectaries small but deep and conspicuous, circular or short-elliptical, usually well above the middle (never near the base) of 3 or all 5 of the principal veins.

Gossypium Klotzschianum

(Described from C.B. 700 at Torrey Pines, Riverside and Palm Springs, 1930, 1931 and 1934. Also from a specimen in the herbarium of Stanford University, collected on the same island (Snodgrass & Heller 656).

A large shrub or small tree, the main stem reaching a height of at least 3 meters and a diameter at base of 7.5 cm., with ascending branches, copiously soft-pubescent with short, mostly stellate hairs on the young stems, leaf-blades (especially beneath), stipules, involucrel and calyx. Fruiting branches short, bearing 1 to 3 flowers. Bark of young stems reddish-brown(?), the older bark light brown. Stipules 8 to 10 mm. long, 2 mm. wide, lanceolate, acuminate. Petioles rather stout, puberulent, 1/5 to 1/2 as long as the blade, reddish-brown towards apex. Leaf-blades yellowish green above, paler beneath, thin and rather soft, often somewhat buckled, punctate (obscurely so when fresh) with imbedded oil-glands, with slightly prominent oil-glands on the veins beneath, broadly ovate, or nearly rectangular below the lobes when these are present, at base subcordate with a very shallow, open sinus, to deeply cordate with a rather narrow sinus, at apex attenuate-acuminate, palmately 7-veined, mostly entire but (on young shoots) often with a coarse tooth or very shallow lobe (not more than 3 cm. long) on one or both sides towards apex, the midlobe broadly deltoid, the lateral teeth or lobes deltoid and obtuse to short-acuminate, the larger blades up to 20 cm. long from the base of the midvein, 2/3 to 4/5 as wide; pulvinus small, reddish brown; nectary single, rather large, deltoid or lanceolate, 1 to 2 cm. above the base of the midvein. Peduncle erect or ascending, stout, 1 to 2 cm. long, quadrangular, not noticeably clavate, puberulent, dotted with slightly

Gossypium Klotzschianum, cont'd.

prominent oil-glands, bearing nectaries at apex (usually one at the base of each bractlet). <sup>1/</sup> Involucel of soft texture persistent to maturity of the fruit; bractlets 3, separate, broadly ovate, cordate, deeply lacinate, 35 to 50 mm. long and about 4/5 as wide, the teeth about 12, lanceolate, attenuate-acuminate, often incurved, the terminal one 1/3 to 2/3 as long as the rest of the bractlet; nectaries well-developed. Calyx about 6 mm. long at anthesis, copiously dotted with slightly prominent oil-glands (green when fresh, drying black), the margin entire or undulate; nectaries none. Corolla surpassing the involucel, very open, rotate-campulate; petals 5 cm. long and approximately as wide near apex, very asymmetrical, plicate and slightly erose on the apical margin, with relatively long greenish claws, stellate pubescent where exposed in the bud, punctate with very small oil-glands, ciliate (especially on the outer margin) much as in Davidsonii, pale greenish yellow (Ridgway V), with a small, striate, carmine, subbasal spot. Column staminiferous less than 1/2 its length. Filaments (lower) about 3 mm. long, light yellow, the enlarged summit without red color and apparently without oil-glands. Anthers about 1 mm. long, narrowly reniform, cream-colored. Pollen near Naples yellow (Ridgway XVI). Pistil 25 mm. long from the summit of the ovary, the exerted portion only about 1/5 as long as the column, pubescent, pale green and dotted with darker green oil-glands; stigmas 4 or 5, coherent nearly to the apex, erect, or separate their whole length above the column and spreading or even recurved, rather broad

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<sup>1/</sup> None, according to Watt.

Gossypium Klotzschianum, cont'd.

and flat, strongly twisted. Capsule 4- to 5-celled, about 20 mm. (?) long, much shorter than the involucrel, tapering, without "shoulder", from near the base to a rather obtuse apex, its surface before maturity light green and smooth. Seeds 5 to 6 mm. long, obovoid, short-stipitate and with a prominent raphe, not at all coherent, falling from the capsule as fast as it opens, not angulate, the inner faces not flattened or very slightly so, coffee-colored, not striate, copiously but not very densely pubescent with greenish gold or rufous hairs that are rather loosely appressed and not crispate.

C.B. 700 (leaves, involucrel and flowers) photographed by Harvey, in 1931.

Gossypium Morrilli (?)

(Described from C.B. 396, at Torrey Pines and Riverside, 1926, 1930, 1934 and 1937).

Stem erect, with numerous ascending-spreading vegetative branches and ascending fruiting branches. Bark of young stems green, becoming tinged with brown, older bark light-brown. Stems (when young) and petioles villous with very long hairs. Leaf-blades very pubescent on both faces when young, villous with long, simple or branched hairs on the larger veins of both faces when older, light green, somewhat longer than wide, the larger ones deeply 5-lobed, the lobes long-acuminate, often coarsely dentate, the basal lobes divergent, the upper sinuses open, rounded at base, the larger blades 12 cm. long from the base of the midvein, 15 cm. wide; basal sinus open, triangular; pulvinus rather dull reddish brown; nectary on the midvein only, very small, sharply defined, nearly circular. Involucel sparsely pubescent; bractlets 4 cm. long, nearly separate or moderately connate, with rather numerous, conspicuously ciliate, very long, moderately broad teeth, the apical tooth occasionally dentate; external nectaries usually absent. Calyx deeply dentate, with long, setose teeth; oil-glands rather numerous; nectaries none (?). Petals about 5 cm. long, between white and pale green-yellow (Ridgway V), spotless. <sup>1/</sup> Pollen approximately baryta-yellow (Ridgway IV). Pistil (exserted portion) elongate. Bells 3- or 4-locked, short, nearly spherical, abruptly and conspicuously sharp-pointed, occasionally with apical furrows, the surface smooth. Seeds fuzzless, or nearly so, stipitate.

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<sup>1/</sup> Spotted petals occur in some of the Kearney and Collins series from Sonora and Sinaloa, all of which are referable, perhaps, to G. Morrilli.

Gossypium Morrilli (?), cont'd.

Lint very short, rather sparse, white.

Gossypium Nenking

(Described from C.B. 393, 430, 725, 727, 754, 769, 772, 783, 817 and 824, Torrey Pines, Riverside and Palm Springs, 1930, 1931, 1934, 1936 and 1937).

Stem erect, slender, with few or several widely ascending or spreading vegetative branches and rather long, spreading or slightly drooping fruiting branches. Bark of young stems brown, becoming almost black, old bark, light-brown or brownish gray. Branches when young densely soft- (cinereous-) pubescent with short, stellate hairs, and long-villous (almost hirsute). Stems (when young) terete, or nearly so. Petioles terete or nearly so, dark-brown, cinereous-puberulent and villous, or hirsute. Stipules 8 to 10 mm. long, persistent, lanceolate, becoming deflexed. Leaf-blades short-ciliate, sparsely to rather copiously stellate-puberulent or -pubescent on both faces (especially beneath), sparsely villous on the veins beneath with mostly simple hairs, becoming glabrate above, deep green and sometimes with pinkish veins above, the veins often dark red, and the whole surface sometimes purplish beneath, rather irregularly and shallowly to deeply 5-lobed (the larger leaves), upper lobes sometimes overlapping at base, oblong-lanceolate, ovate-lanceolate, or oblong-ovate, obtuse, acutish, or (often) sharply short-acuminate, often mucronulate, at apex, sometimes with a very short, broad, rounded tooth in the upper sinuses, these very broad and rounded at base, midlobe sometimes  $3/5$  the length of the blade, often somewhat constricted at base, basal lobes very obtuse, ascending, divergent, or somewhat reflexed, sometimes reduced to coarse teeth, the larger blades 6 to 7 cm. long from the base of the midvein, 8.5 to 9 cm. wide; basal sinus none, or very shallow, open, and broadly triangular, or rather deep and

Gossypium Nanking, cont'd.

narrow; pulvinus very small, dull brown, reddish, or purplish brown; nectary often very small (less than 1 mm. long) but well-defined, circular, short-elliptic, or broadly triangular, usually near the base of but sometimes rather high on the midvein, a smaller one sometimes present on one or both principal lateral veins, sometimes lacking altogether. Peduncles terete or nearly so, not furrowed, short to very long, declined, often so before anthesis, usually strongly so at, and after, anthesis. Involucel of soft, or rather crisp, texture, often bronze-green, sparsely to copiously pubescent; bractlets nearly separate to strongly connate, not spreading, cordate-ovate, 25 mm. long, with few, usually short, erect or slightly incurved teeth, sometimes nearly entire; external nectaries none, or present but apparently non-functional. Calyx 4 mm. long at anthesis, the margin usually entire or undulate, sometimes shallowly crenate with broad, rounded teeth (occasionally deeply and sharply dentate?); oil-glands few or numerous, conspicuous, black; nectaries very large, inverted delta-shaped. Flowers usually pendent. Corolla 25 to 45 mm. long; petals ciliate near base, but not very densely so, picric-yellow (Ridgway IV),  $\frac{1}{2}$  with solid spots occupying  $\frac{1}{4}$  to  $\frac{1}{3}$  of the petal, these between pomegranate-purple and Bordeaux (Ridgway XII). Column staminiferous nearly to the base, or only on the upper half. Pollen light-cadmium, or between apricot-yellow and empire-yellow (Ridgway IV). Pistil 1.5 to 2 cm. long (measured from the base of the column), whitish, with yellow oil-glands; stigmas barely to considerably surpassing the anthers, sometimes separate at apex. Bolls 3- or 4-  

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 $\frac{1}{2}$  Nearly white in C.B. 784, except where exposed in the bud, there yellowish.

Gossypium Nanking, cont'd.

(sometimes 5-) lock, small, spherical or very short-ovoid to rather long-ovoid or oblong-ovoid, apiculate to acuminate, the point very sharp, often with long, deep, apical furrows, the surface pale green, or reddish where exposed, rather shallowly to deeply pitted. Seeds densely and completely covered with short, white, or very pale-green fuzz. Lint very short, coarse, white.

Gossypium neglectum

(Described from C.B. 785, Riverside, 1936 and 1937).

Stems erect, slender, with few, widely ascending or spreading vegetative branches and rather long (for an Asiatic cotton) spreading or slightly drooping fruiting branches. Branches (when young) and petioles sparsely short-stellate and densely villous with longer, mostly simple hairs. Bark of young branches brown, becoming very dark-brown, older bark light-brown. Petioles nearly as long as the blades. Leaf-blades dark grayish green, copiously short-pubescent on both faces with mostly stellate hairs, villous on the veins beneath with mostly simple, hairs, 5-parted (okra-type), the upper lobes oblong-lanceolate, short-acuminate (often bluntly), the blade somewhat buckled and deeply cupped near base, the upper sinuses narrow, obtuse at base, the midlobe 2 cm. wide, not constricted at base, the basal lobes divergent, often deeply cleft, the larger blades up to 9.5 cm. long from the base of the midvein, 10.5 cm. wide; basal sinus shallow, open, triangular; pulvinus greenish or brownish, nectary none. Peduncles erect or ascending in bud and at anthesis, often decurved soon after anthesis. Involucel green, soft, copiously short-pubescent; bractlets deltoid, cordate, moderately to (often) strongly connate, 3 cm. long, with few, very short (mostly 1 to 2 mm. long) subulate teeth; external nectaries none or very rudimentary. Calyx about 9 mm. long at anthesis, sharply dentate, with short, acute, triangular, or subulate teeth; oil-glands rather numerous, large, black; nectaries pubescent and bearing oil-glands, probably non-functional, sometimes none. Corolla 45 to 55 mm. long; petals slightly ruffled at apex, pale greenish yellow (Ridgway V), fading copper-colored, with solid spots occupying

Gossypium neglectum, cont'd.

1/4 to 1/5 of the petal, these between pomegranate-purple and Bordeaux (Ridgway XII). Column staminiferous nearly to the base. Stamens rather few; filaments long, purplish. Pollen light-cadmium, or between this color and empire-yellow (Ridgway IV). Pistil 2 cm. long, above the ovary; stigmas barely to well-exserted, separate at apex.

G.B. 785 photographed by Peebles, #158, Riverside, 1936.

Gossypium neglectum (f. albo-purpureum).

(Described from C.B. 786, Riverside, 1937)

Differs from C.B. 785 as follows: Fruiting branches shorter, more strongly decurved. Leaf-blades pale grayish green, less deeply and narrowly 5-lobed, the upper lobes ovate-oblong, the midlobe 4.5 cm. long and 2 cm. wide, the basal lobes more generally and often deeply cleft, larger blades 7.5 cm. long from the base of the midvein, 9 cm. wide. Bractlets slightly connate or nearly separate, more deeply cordate, about 5 cm. long with more numerous, much longer, broadly lanceolate, setaceous acuminate teeth. Calyx at anthesis about 6 mm. long, margin merely undulate or very shallowly crenate. Corolla 3.5 cm. long; petals pale lavender, with larger spots, these occupying about 1/2 of the petal. Stamens more numerous and crowded; filaments shorter. Pistil 2 cm. long above the ovary, the exerted portion about 8 mm. long. Bolls 3- or 4-loc, 3.5 cm. long, ovoid, sharply acuminate, with 1 or more well-marked, apical furrows, the surface rough, deeply pitted. Seeds covered with short, greenish fuzz. Lint very short, coarse, white.

Gossypium obtusifolium (?)

(Described from C.B. 764, Torrey Pines, 1931).

Stems and petioles extremely villous. Leaf-blades light yellowish green, sparsely pubescent above with short, appressed, simple or branched hairs, densely so beneath and on the margins with mostly stellate hairs and scattered, longer, simple ones on the large veins, rather shallowly 5-lobed with broad, rounded, mucronate lobes, the midlobe somewhat contracted at base; basal sinus open and shallow; pulvinus very small, reddish brown; nectary towards base of midvein (and sometimes on one of the principal lateral veins) rather prominent, broader than long. Peduncles very short, densely villous, spreading or sometimes sharply deflexed even before anthesis. Involucl (one flower only) rather soft, stellate-pubescent; bractlets strongly connate, with about 9 very short teeth. Calyx with margin merely undulate; oil-glands rather few but conspicuous (black). Corolla relatively large, more than twice as long as the involucl; petals light yellow with dark red spots occupying about 1/4 the area of the petal. Column staminiferous nearly to the base. Filaments white. Pollen orange. Stigmas about equalling the uppermost stamens.

Gossypium patens

(Described from C.E. 541, Torrey Pines, 1931).

Closely resembles G. contextum in vegetative characters, flowers,  
and bolls.

Gossypium peruvianum

(Described from C.B. 467, 662, 663 and 664, Torrey Pines, Palm Springs and Riverside, 1930 and 1931).

Petioles glabrate, somewhat warty. Leaf-blades, when young, sparsely, or densely white-pubescent, almost tomentose beneath with (only?) stellate hairs, when older glabrate or sparsely pubescent on the larger veins and pulvinus above, and on the margins, glabrate, or remaining sparsely to copiously pubescent beneath, becoming dark-green and slightly to very shiny above, very thick and firm, very large, deeply 5- to 7-lobed, the upper lobes broadly oblong-ovate or ovate-oblong, long-acuminata, occasionally coarsely toothed, the 4th and 5th lobes divergent, the 6th and 7th lobes, when present, very short and deflexed; basal sinus deep, narrowly triangular, open below, often closed above by the overlapping leaf-margins; pulvinus dull brown or brownish; nectary nearly circular, short-elliptic, triangular, or elongate, sharply defined, near base of the midvein, only, or an additional one on one of the principal lateral veins. Involucel large, of crisp texture, glabrous to very pubescent and ciliate; bractlets separate or somewhat connate, broad and very deeply cordate, with few or numerous, relatively short, sometimes very slender teeth; external nectaries none. Calyx margin nearly entire to conspicuously dentate; oil-glands numerous. Corolla very large, surpassing the involucel; petals deep yellow, conspicuously spotted (about grade 8). Staminal column long. Pollen orange- (empire- ?) yellow. Stigmas moderately exserted, separate at apex. Bolls 5- or 4-lock, very plump or rather slender, bluntly very short-pointed or more acuminate; dark green, somewhat shiny, rough, deeply pitted. Seeds naked except for a very small, basal tuft of fuzz. Lint short, rather wooly, white.

Gossypium punctatum

(Described from C.B. 437, Palm Springs and Riverside, 1931, 1936 and 1937).

Stem erect, rather stout, with numerous ascending-spreading vegetative branches and spreading-drooping fruiting branches. Bark of young stems green to reddish brown, older bark pale-brown. Stems (when young) and petioles sparsely villous, with long, lax hairs. Leaf-blades pubescent like the petioles on the margins and veins beneath, glabrous or nearly so above, deep-green, firm, about as wide as long, very shallowly 5-lobed, with deltoid, more or less acuminate, often coarsely few-toothed lobes, upper sinuses very shallow and open, acutish or rounded at base, the basal lobes often reduced to coarse teeth, the large blades 11 cm. long from the base of the midvein, 15 cm. wide; basal sinus rather deep and narrow; pulvinus very large, liver-colored; nectary near base of midvein only, or on one or both principal lateral veins, conspicuous, rounded, or elongate and narrowly triangular. Involucre of rather crisp texture, nearly glabrous except the sparsely long-ciliate teeth; bractlets separate or nearly so, very broadly ovate and deeply cordate, 4.5 cm. long, dentate on nearly the whole margin, with rather long, lanceolate, setaceous-acuminate teeth; external nectaries rather deep, obovate, about 1.5 mm. long. Calyx 5-dentate, with rounded to very acute teeth; oil-glands numerous, black; nectaries small but functional, transversely elongate. Corolla 4.5 cm. long; petals very pale yellow, spotless. Filaments long, pale yellow. Pollen cream-colored. Stigmas exserted, but overtopped by the uppermost stamens. Bolls 3- to 5-lobed, rounded-ovoid, barely pointed, with very short, or no, apical furrows, the surface smooth, pea-green. Seeds almost completely covered with white fuzz. Lint extremely short, white.

C.B. 437 photographed by Peebles, #137, Riverside, 1936.

Gossypium purpureascens

(Described from C.B. 531 and 671, Torrey Pines, Palm Springs and Riverside, 1930 and 1931) and 1937

Stems dark purple, nearly black, shiny, warty, glabrous, or nearly so, except when very young. Petioles similar, or persistently pubescent towards the apex, much longer than the blades. Leaf-blades short-ciliate, sparsely to rather densely pubescent on both faces, especially on the larger veins, with rather long, mostly branched hairs, deep-green above tinged with purple and with reddish purple veins, the veins much deeper colored beneath, rather sparsely punctate with black oil-glands, these often rather conspicuous beneath, large, deeply 5- (sometimes 7-) lobed, the upper lobes ovate or oblong-ovate, sharply short-acuminate, often coarsely dentate, the upper sinuses narrow, acute, the 4th and 5th lobes divergent, the 6th and 7th lobes, when present, very short, the larger blades 13 cm. long from the base of the midvein, 15 cm. wide (probably sometimes much larger); basal sinus narrow, rather deep and sometimes closed above, or shallow and broadly triangular, or almost none; pulvinus large, liver-colored to nearly black; nectary near base of midvein, only, or on the principal lateral veins, also, large and deep, elliptic, triangular-elliptic, or elongate (up to 10 mm. long).

Gossypium sanguineum.

(Described from C.B. 781 and 787, Riverside, 1934, 1936 and 1937).

Stem slender or stout (more than 5 cm. in diameter at base in old plants), erect, with few, ascending vegetative branches and slender, spreading or slightly decurved, fruiting branches. Bark of young stems dark-brown, becoming nearly black, old bark light-brown. Stems (when young) and petioles densely villous-hirsute with long, mostly simple hairs. Leaf-blades short-stellate-pubescent and long-villous on the veins, especially beneath, of firm texture, rather light-green tinged with purple and with reddish veins, deeply 5-lobed (cleft to or below the middle), the lobes oblong-lanceolate or ovate-oblong, sharply short-acuminate, the midlobe up to 27 mm. wide, somewhat constricted at base, the upper sinuses deep and narrow, rounded at base, the larger blades 8.5 cm. long from the base of the midvein, 8 cm. wide; basal sinus broad, very shallow, open, or almost none; pulvinus conspicuous, reddish brown; nectary none. Peduncles erect or spreading, often somewhat decurved after anthesis. Involucel of rather soft texture, bronze-purple, short-pubescent; bractlets strongly connate, broad, ovate-deltoid, acute, subcordate, 2.5 cm. long, entire or very shallowly few-toothed near apex, the teeth very short, triangular-subulate; external nectaries none, or rudimentary. Calyx glabrous, shallowly dentate with broadly deltoid, acutish teeth; oil-glands few, conspicuous, black; nectaries none. Corolla 3 cm. long; petals only slightly ruffled, approximately spinel-red (Ridgway XXVI) on the upper part and exposed outer surface, shading to nearly white around the spots, these occupying nearly 1/2 of the petal, between pomgranate-purple and Bordeaux (Ridgway XII). Column staminiferous nearly to the base. Anthers purplish brown.

Gossypium sanguineum, cont'd.

Pollen pale yellow. Pistil 15 mm. long above the ovary; stigmas barely surpassing the stamens. Bolls 4-look, about 3 cm. long, plump, ovoid, bluntly short-pointed, deeply pitted, reddish where exposed.

Gossypium Schottii.

(Described from C.B. 672, Torrey Pines, Palm Springs, and Riverside, 1930, 1931 and 1937).

Stems erect, sparingly branched, branches ascending, very soon glabrous. Bark of young stems dark purplish brown. Petioles similarly colored, nearly glabrous. Leaf-blades, when mature, sparsely pubescent on the veins and margin with simple and branched hairs, dark-green above with purplish brown veins, very deeply and narrowly 5-lobed, the upper lobes oblong-lanceolate, long-acuminate, the midlobe often irregularly cleft, or very coarsely toothed towards base, the upper sinuses narrow, acute or acutish, the basal lobes ascending and often cleft, the larger blades about 16 cm. long from the base of the midvein, about 16 cm. wide (probably sometimes larger); basal sinus very shallow, triangular, open, or closed above; pulvinus purplish brown; nectary near base of midvein only, small but rather deep and with a prominent margin, more or less triangular, sometimes narrowly so, or short-elliptic, or elongate, slit-like.

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<sup>1/</sup> A character also shown by the okra-leaf variant of Acala cotton (G. hirsutum).

Gossypium Stocksii. <sup>1/</sup>

(Described from C.B. 763, Riverside, 1934 and 1936).

Plant small, with trailing branches. Petiole and blade sparsely stellate-puberulent. Leaf-blades 5-lobed, with nearly orbicular, very obtuse or truncate, mucronulate lobes, the upper sinuses deep and narrow, closed by overlapping, the larger blades 35 mm. long from the base of the midvein, 45 mm. wide; basal sinus shallow and broadly triangular, or rather deep and narrow; pulvinus very small, scarcely colored; nectary minute, well above the base of the midvein, or none. Involucl green, sparsely puberulent; bractlets 20 to 23 mm. long, widely separated, clawed, deeply lacinate (to 1/2 or more of their length) with subulate, setaceous-acuminate teeth; external nectaries present but apparently non-functional. Calyx rather densely short-pubescent, deeply dentate with long, subulate teeth, these deltoid at base; oil-glands very few and small, black; nectaries none. Corolla 20 to 25 mm. long; petals near sulphur-yellow (Ridgway V), with relatively large (6 to 8 mm. long), but not very solid, pomegranate-purple (Ridgway XII) spots. Pollen paler than baryta-yellow (Ridgway IV). Pistil about 12 mm. long above the ovary; stigmas well-exserted.

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<sup>1/</sup> The involucl is very different from that of other Asiatic cottons. The leaf-shape is much as in G. africanum.

Gossypium Sturtii.

(Described from C.B. 564 and 532, Torrey Pines and Riverside, 1930, 1934 and 1937).

A symmetrical, many-branched shrub, attaining a height of about 1.5 meters, glabrous except the petals and seeds, punctate with slightly prominent oil-glands on the same parts as in G. Armourianum. Fruiting branches 1- or 2-flowered. Stems (when young) and petioles rounded, but somewhat compressed. Bark of young stems reddish brown or pale green, very glaucous, older bark light purplish-grey. Stipules caducous, but more persistent than in Harknessii and Armourianum, about 7 mm. long and 2 mm. wide, lanceolate, setose-acuminate. Petioles slender, 2/3 as long to as long as the blade, pinkish towards apex. Leaf-blades thickish, firm, bluish green, very glaucous, not shiny, copiously black-punctate, entire, ovate, acutish, cuspidate, subcordate, palmately 3- to 5-veined, the larger blades up to 8 cm. long; basal sinus very short and narrow; pulvinus very small, pinkish or purplish brown; nectary near base of midvein, lanceolate, often bright red. Feduncles at anthesis about 12 mm. long, nearly erect, terete, not furrowed. Involucel persistent to maturity of the fruit, somewhat spreading at anthesis; bractlets 3, green or slightly purplish, separate, broadly ovate or oblong-ovate, narrowed and subcordate at base, short-acuminate and cuspidate, entire or very nearly so, about 20 mm. long; external nectaries 3, often red. Calyx 6 mm. long, dentate with triangular-subulate teeth about 1.5 mm. long; oil-glands numerous, prominent, black; nectaries none. Corolla open-campanulate, 2 to 3 times as long as the involucel; petals 35 to 60 mm. long, about equally wide near apex, very asymmetric, wedge-shaped, with very short claws, stellate-puberulent where exposed in bud, ciliolate on the outer margin, densely ciliate on both margins near base,

Gossypium Sturtii, cont'd.

slightly erose, flat or nearly so (not ruffled), pale mauve or lilac (Ridgway XXV), drying bluish, conspicuously black-punctate, with conspicuous basal spots, these between pomegranate-purple and Bordeaux (Ridgway XII), drying dahlia-purple (Ridgway XII), 12 to 15 mm. long, very asymmetric, deeply feather-margined, extending on to the claw. Column 17 to 20 mm. long, stamiferous nearly to the base. Filaments purple, the lower 1.5 to 2 mm. long, the connective bordered with red. Anthers purple. Pollen cream-colored. Pistil white, with black oil-glands, 20 to 25 mm. long from the top of the ovary, the exerted portion about 1/3 as long as the column; stigma (proper) erect, closely coherent. Capsules 4- or 5-celled, about 16 mm. long, oblong-ovoid, apiculate to acuminate with a point about 2 mm. long, apparently lacking intracarpellary hairs, the surface before maturity pale green, not pitted, with large, prominent, nearly black oil-glands. Seeds 4 to 5 mm. long, sharply angled, acute at both ends, broadly short-stipitate, densely pubescent with closely appressed, crispate, pale-green hairs, these longer at the apex and on the angles of the seed.

This West Australian plant seems related to the 5 American wild species but differs from all of them in being very glaucous, in the color of its petals, in the more nearly basal petal spot, and in having the column stamiferous nearly its entire length. It is extremely subject to nematode attack, more so than any other Gossypium at Riverside.

C.B. 564 photographed by Feebles, #153, Riverside, 1936.

Gossypium Thurberi

(Described from C.B. 112, Torrey Pines, Sacaton, and Riverside, 1930, 1933 and 1937, and from herbarium specimens).

A large shrub, with main stem attaining a length of 2.5 meters and a diameter at base of 10 cm., dotted with slightly prominent oil-glands (drying black) on the twigs, petiole, veins of leaf-blades dorsally, peduncle, involucrel, calyx, petals, column and exerted portion of pistil. Stems (when young) quadrangular, soon glabrous. Fruiting-branches short, ascending, usually forked, several-flowered. Bark of young stems reddish brown, or green tinged therewith, older bark light brownish gray. Stipules 6 to 7 mm. long, subulate, extremely fugacious. Petioles somewhat shorter than the blades, rather slender, quadrangular, soon glabrous, often somewhat deflexed. Leaf-blades thin but firm, bright green above, paler beneath, rather conspicuously whitish-margined, ciliate with simple or branched hairs, puberulent on the veins, otherwise glabrous or nearly so, subcordate or cordate, pedately 3- to 5-parted, the divisions lance-elliptic or lanceolate, entire or undulate-margined, attenuate-acuminate, often setose-tipped, the midlobe up to nearly 4 cm. wide, strongly constricted at base, often as if stalked, the upper sinuses very narrow, acutish at base, the basal lobes often strongly reflexed, the larger blades up to 15 cm. long, from the base of the midvein; basal sinus very open-triangular, narrowed near base; pulvinus small, greenish or brownish, puberulent; nectary near base of midvein 1 to 4 mm. long, triangular, lanceolate, or elliptic. Peduncles 10 to 30 mm. long, erect or ascending, angular, furrowed, clavate at apex, bearing an often large nectary at the base of each bractlet, or the third often rudimentary or wanting. Involucrel persistent to maturity of the fruit, spreading; bractlets 3 (rarely 4), separate,

Gossypium Thurberi, cont'd.

7 to 15 mm. long at anthesis, 2.5 to 5 mm. wide at base, lanceolate, attenuate-acuminate puberulent, the margin usually entire or merely undulate, sometimes dentate with 2 or 3 short, subulate teeth. Calyx about 4 mm. long at anthesis, puberulent and ciliolate, the margin usually entire but undulate (occasionally with a long subulate tooth); oil-glands small, brown, very numerous; nectaries none. Corolla rather shallowly cup-shaped; petals 25 to 30 mm. long, very asymmetrically obovate, with very short claws, the apical margin slightly crose, puberulent and often reddish on the part exposed in bud, ciliolate above on the outer margin, ciliate below, densely so on the claws, white fading bright pink, sometimes with a rather faint, striate, carmine, supra-basal spot. <sup>1/</sup> Stamens numerous; filaments very slender, the lower 3.5 to 4 mm. long, the enlarged summit bordered with dull orange or red under the anther cell; anthers reniform, less than 1 mm. long, dull orange, or cream-colored. <sup>Pollen whitish, or cream-colored.</sup> Pistil about 18 mm. long above the ovary, the exerted portion about one-half as long as the staminal column, pale green with darker green oil-glands; stigmas closely coherent. Ovules usually 6 per locule. Capsules 12 to 15 mm. high, usually 3- but occasionally 4-celled, nearly cylindrical to broadly ovoid, rounded at apex and apiculate or slightly depressed, with a dull and smooth (not pitted) surface, the numerous oil-glands superficial, margins of the valves conspicuously ciliate within with long, weak hairs, these holding the seeds in the capsule after the latter matures. Seeds 3.5 to 5 mm. long, turbinate, angulate with a rounded summit, inequilaterally 3- or 4-sided, with flattened sides, not stipitate, pubescent with soft, loosely appressed, white hairs, rather densely so at apex. <sup>2/</sup>

<sup>1/</sup> Harrison estimates that only 10 to 15 percent of the plants seen by him growing wild in Arizona have petal spots.

<sup>2/</sup> Pubescence much as in G. Klotzschianum, but whiter.

Gossypium tomentosum.

(Described from C.B. 527, Torrey Pines, Palm Springs and Riverside, 1930, 1934 and 1936).

Plant low, with numerous, wide-spreading vegetative branches. Bark of young stems pale-green, older bark light-brown. Stems (when young), petioles, blades and involucels densely whitish tomentose with extremely short, stellate hairs. Petioles about as long as the blades. Leaf-blades bluish at first, then grayish green, with pale green veins, sparsely and inconspicuously black-punctate beneath, rather deeply 5-lobed with spreading, ovate or oblong-ovate <sup>these</sup> (usually acutely) short-acuminate lobes, upper sinuses narrow, often closed, the larger blades up to 12 cm. long from the base of the midvein, 15 cm. wide; basal sinus narrow or open and broadly triangular; pulvinus small, pale-green; nectary none. Involucel 25 to 30 mm. long; bractlets connate only very near the base, oblong or oblong-ovate, subcordate, shallowly dentate on nearly the whole margin, with short, deltoid-subulate teeth; external nectaries none. Calyx 4 to 5 mm. long, with entire margin; oil-glands rather numerous, black; nectaries none. Corolla about 3.5 cm. long, very open-campanulate; petals brilliant lemon-yellow (Ridgway IV), changing color only slightly in fading, glossy, spotless, ruffled. Column staminiferous nearly to the base. Stamens numerous; filaments (lower) about 4 mm. long, slender, yellowish; anthers light orange-yellow. Pollen cream, changing to pale yellow. Pistil about 30 mm. long, very slender, the exerted portion often as long as the column, with numerous, black oil-glands; stigmas (proper) very short, sometimes separate. Bolls 3- or 4-lobed, about 2 cm. long, sharply acuminate, shallowly and finely pitted. Seeds densely covered with reddish brown hairs about 15 mm. long.

C.B. 527 photographed by Peebles, #164, Riverside, 1936.

Gossypium transvaalense

(Described from C.B. 1068, Riverside, 1936)

Very similar in vegetative characters to G. africanum. Bractlets somewhat connate, broadly ovate, deeply lacinate with lance-subulate teeth. Calyx dentate with short, deltoid teeth; oil-glands few; nectaries large, inverted delta-shaped. Corolla about twice as long as the involucel, about 3.5 cm. long; petals between Martius and picric yellow (Ridgway IV) with conspicuous, solid spots approaching Bordeaux in color (Ridgway XII). Pollen between apricot yellow and Empire yellow (Ridgway IV). Column staminiferous about 4/5 of its length. Filaments short, white. Pistil only slightly exerted.

C.B. 1068 photographed by Peebles, #154, 161, Riverside, 1936.

Gossypium tomentosum.

(Riverside, September 26, 1936)

C.B. 527. Plant low, with numerous, wide-spreading limbs. Young bark pale green, old bark light brown. Twigs, petioles, blades and involucls densely whitish-tomentose with very short hairs. Leaf blades cordate with a narrow basal sinus, rather deeply 5-lobed with spreading, ovate or oblong-ovate, short-acuminate lobes; nectaries none; pulvinus and veins pale green. Bractlets connate only very near the base, oblong or oblong-ovate, subcordate, shallowly dentate on most of the margin, the teeth short, deltoid-subulate; nectaries none. Calyx with entire margin, no nectaries, and rather numerous black oil glands. Corolla very open-campanulate, nearly twice the length of the involucl; petals buttercup-yellow (changing little in withering), glossy, spotless, crispate on the margin. Stamens numerous. Filaments long, yellowish. Anthers light orange-yellow. Pollen cream, turning pale yellow. Stigms long-exserted, 15 to 20 mm. long, slender, with numerous black oil-glands.

Cesypium sanguineum.

(Riverside, September 26, 1936)

C.B. 787. Stem very stout, more than 2 inches in diameter at base (plant old), with rigid, spreading branches. Young bark brown (nearly black) old bark brownish gray. Twigs and petioles hirsute. Leaf blades pilose beneath, glabrate above, of firm texture, with reddish brown veins and pulvinus, 5-lobed, cleft to or below the middle, the lobes ovate or oblong-ovate, obtuse or rounded at apex, blade subcordate at base with a very shallow, open sinus; nectaries none. Involucel dark bronze, the bractlets strongly connate, broad, ovate-deltoid, acute, subcordate, entire or very shallowly few-toothed near the apex. (Flowers described in 1934 for C.B. 781). Calyx nectaries none.

Gossypium punctatum

(Riverside, September 26, 1936)

C.B. 437 (3 plants). Stem erect, with numerous horizontal or somewhat drooping branches. Young bark green to reddish brown, old bark pale brown. Twigs and petioles sparsely villous with long, lax hairs, with similar hairs on the leaf margins and veins beneath, blades glabrous or nearly so above. Leaf-blades very shallowly 5-lobed with deltoid, acuminate lobes and often coarsely few-dentate, deeply cordate with a narrow basal sinus, deep green, firm; pulvinus very large, liver-colored; nectaries near base of the 3 principal veins, conspicuous, rounded. Brectlets separate or nearly so, very broadly ovate, very deeply cordate, dentate on nearly the whole margin with rather long, lanceolate, setaceous-attenuate teeth; a nectary at the base of each brectlet. Calyx 5-dentate with rounded to very acute teeth; nectaries present, oil glands numerous, black. Petals very pale yellow, spotless. Filaments long, pale yellow. Pollen cream (?). Stigmas exerted but overtopped by the upper stamens. Bolls 4-5-lobed, rounded-ovoid, barely pointed, apical furrows very short or none, surface smooth, pea-green.

Coccygium Hanking.

(Riverside, September 26, 1936)

C.B. 824 (2 plants). Much-branched, with spreading, rather rigid branches. Young bark nearly black, old bark brownish gray. Twigs and petioles hirsute. Leaf blades sparsely pubescent beneath with short, stellate and fewer long, simple or bifurcate hairs, dark green above, purplish beneath. Shallowly cordate with an open basal sinus, the larger blades deeply 5-lobed with oblong-ovate, short-acuminate lobes; pulvinus and petioles purplish brown, veins pinkish above, darker colored beneath; a well-defined, rounded nectary on the midvein about 1/2 way between the base of the midlobe and the base of the blade. Involucel bronze, the bractlets strongly connate, cordate-ovate, few-denticulate near apex; external nectaries none. Calyx with merely undulate margin, few oil glands, and large nectaries at base between the bractlets. Folia 3-4-lobed, ovoid, abruptly very short-acuminate, deeply pitted, pale green, reddish where exposed.

Gossypium Hopi.

(Riverside, September 26, 1936)

C.B. 716. Old plant with a very stout woody stem, ascending limbs and spreading branches. Young bark green or tinged with red, old bark brownish gray. Young twigs and petioles very sparsely pilose. Leaf blades very sparsely pilose beneath and on the margins, the marginal hairs largely simple, glabrous above, dark green, firm, about as broad as long, deeply cordate with an open sinus, very shallowly 3-lobed with broadly deltoid, acutish to short-acuminate lobes; pulvinus conspicuous, liver-colored; a small but well-defined nectary near base of midvein. Bractlets strongly connate, broadly ovate, cordate, rather deeply cleft with several lanceolate, setaceous-acuminate teeth; a large nectary at base of each bractlet. Calyx 5-dentate with deltoid, acute to attenuate-acuminate teeth; nectaries present; oil glands numerous, black. Corolla about  $1\frac{1}{2}$  times as long as the involucrel; petals pale yellow, spotless, margin nearly entire. Filaments rather long, white. Pollen pale yellow. Stigmas short-exserted.

Gossypium anomalum.

(Riverside, September 16, 1936)

C.B. 1051 (1 plant). Plant tall, with rather numerous, ascending branches. Bark of twigs green or brownish, of the old stems light brown. Branchlets, petioles and leaf-blades rather densely soft-pilose with stellate hairs (the blades almost tomentose); also villous with fewer long, spreading, apparently simple hairs. Leaf blades pale green, deeply lobed, the larger 5-lobed, with rounded-ovate, acute (not acuminate) lobes and a deep, narrow basal sinus; pulvinus not colored; a small but well-defined nectary on each of the 3 principal veins, above the base of the corresponding lobe. Bractlets separate and distant, narrowly lanceolate, 4 mm. wide or less, almost entire or shallowly 3-toothed near the apex; a large rectangular nectary at the base of each bractlet, externally. Calyx deeply 5-cleft with deltoid-subulate teeth, strongly ribbed with thick, prominent veins; oil-glands few; nectaries none. Corolla about 40 mm. long, about twice the length of the involucre, funnelform (little expanded at apex). Petals lavender-pink, with large, dark, red-purple spots. Stamens numerous. Filaments very short. Pollen cream. Stigmas well-exserted. Bolls about 20 mm. long, 3- or 4-lobed, ovoid, abruptly and rather sharply acuminate, pea-green, verrucose (the oil glands prominent).

*Descriptive Notes on*

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS.

# 25 *Gossypium* sp., Belise. (South American group).

Torrey Pines, Sept. 1930. Two plants, flower on one only. Stems glabrous. Petioles slightly warty, soon glabrate. Leaves rather copiously pubescent beneath, sparsely so on the larger veins and on the pulvinus above, with rather long mostly stellate hairs, dark green and shining above with a rather conspicuous dull reddish-brown pulvinus, relatively (for type) shallowly 5-lobed, lobes triangular-ovate, attenuate-acuminate, the basal lobes short, at right angles or nearly, basal sinus shallow, closed by the overlapping leaf bases near base for much of its length, nectaries conspicuous, rounded-triangular or short-elliptic, near bases of the 3 principal veins. Involucre exceeding the rather large corolla, the bracts crisp, nearly glabrous, broad, with few relatively short rather slender teeth. Calyx deeply crenate with one of the teeth very long and subulate-acuminate, oil glands very numerous. Petals bright yellow, spotted (grade 6). Pollen orange-yellow (grade 6). Stigmas not exerted.

Torrey Pines, Sept. 18, 1931. (Both plants) Bolls 3-lock to 5-lock, ovoid or oblong-ovoid, tapering to a (usually) rather blunt point, surface dark green, shiny, deeply pitted. The involucral bracts have numerous teeth with long subulate tips. Calyx margin crenate with broad, rounded teeth (none subulate-acuminate so far as observed to-day). Petal spots grade 7. Stamens very numerous, borne nearly to the base of the column. Stigmas sometimes slightly exerted.

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS.

# 101 Gossypium Davidsonii, Lower California. Torrey Pines, Sept., 1930.

Young stems dark reddish-brown, older ones with light brown bark, petioles reddish. Young stems and petioles rather densely stellate-puberulent. Leaves deep green above, somewhat paler beneath, with a small reddish-brown pulvinus, soft stellate-pubescent (not densely so) on both surfaces, entire or the larger ones very slightly 2-3-lobed, triangular-ovate, nearly as wide as long, truncate or subcordate at base, nectary small but conspicuous near base of midvein only. Flower (as noted in 1928) small, involucre bracts very pubescent with few rather long and broad teeth, calyx not dentate and with very few oil glands, petals rather pale yellow, conspicuously spotted, pollen yellow, stigmas rather long, bolls 4-5-lock, small, round, very short-pointed, smooth.

<sup>1930</sup>  
Riverside (Sept. 26). Two plants, which have petioles considerably shorter than the leaf blade, the latter densely pubescent especially beneath, often considerably longer than wide, leaf nectary circular or nearly so. Bolls abruptly very sharp-pointed, mostly 5-lock. Intercarpellary hairs conspicuous.

Torrey Pines, July 15, 1931. Stigmas pale green, occasionally separate and more or less recurved as in G.B. #700 (G. Klotzschianum)

Torrey Pines, Sept. 17, 1931. Many of the bolls have in the center 2 or 3 rudimentary carpels. Seeds often coherent, covered with very closely appressed crinkled hairs which are greenish at first but soon become brownish. Involucre bracts separate to the base, their teeth about 10. Petals strongly rotate with very short but distinct claws and crinkled margin, the spots dark red (grade 8). Stamens confined to the upper half of the staminal column, anthers very small. Pollen pale yellow.

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS.

# 112. Thurberia thespesioides. Torrey Pines, Sept., 1930.

Leaf nectary very large, elongated-quadrangular, almost at base of the midvein only. There are also large and conspicuous nectaries on the enlarged summit of the pedicel below 2 or all 3 of the involueral bracts, the third nectary usually rudimentary. Nectaries apparently none on the outer surface of the calyx.

Riverside, April, 1931. It was noted that the inter-carpellary hairs hold the seeds in the old pods, suggesting possibly that this character may be of utility to the plant, if the seeds fall out more readily in wet weather.

GOSSEYIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

# 127 E. *Gossypium* sp. Caravonica cotton, Cuba. (South American group) Torrey Pines. Three plants, flowers on second and third only. Stems and petioles nearly glabrous. Leaves sparsely pubescent beneath and on pulvinus above with long soft hairs, dark green and shining above with a dull light-brown pulvinus, very deeply 5-lobed, the upper lobes ovate-oblong, attenuate-acuminate, lower lobes relatively long, at right angles or nearly so, basal sinus shallow, closed near its base, open below, nectary round or somewhat triangular, near base of midvein and often of one or both principal lateral veins. Involucre large, nearly squalling to somewhat exceeding the rather large corolla, bracts separate with few or rather numerous slender teeth. Calyx short-dentate, oil glands numerous. Petals bright yellow, rather weakly spotted (grades 5-6). Staminal column long, pollen orange-yellow (grade 5). Stigmas only slightly exerted.

Torrey Pines (Sept. 17, 1931) Bolls 3-locks, fairly long but plump, short-pointed, surface copiously but not deeply pitted. Seeds fuzz-less except for a small basal tuft. Lint white or nearly so.

GOSSYPIMUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

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# 177 C. *Gossypium* sp. Philippine Islands. (South American group). Torrey Pines. Two plants. Stems and petioles glabrous or nearly so. Leaves rather sparingly pubescent beneath and on the pulvinus and large veins above with long appressed hairs, bright green, large, very deeply 5 to 7-lobed, the upper lobes very long, oblong-lanceolate, attenuate-acuminate, the midlobe often very coarsely dentate, the 4th and 5th lobes at right angles or somewhat reflexed, the 6th and 7th lobes (occasionally present) nearly parallel to the petiole, basal sinus broadly triangular, closed near its base, nectary round or round-triangular, near base of the midvein only. Involucre from nearly equalling to slightly exceeding the very large corolla, bracts strongly connate towards base with numerous very long and broad teeth. Calyx margin undulate or crenate, oil glands very numerous. Petals bright yellow, deeply spotted (grade 8). Pollen orange-yellow (grade 6). Stigmas from scarcely exerted to very long.

*Torrey Pines, Sept. 17, 1931. Bolls 3-lob long, alternate from near the base to a sharp point, deeply pitted. Seeds fuzz-less except for a small basal tuft. Lint long, white. The seeds are free in the first plant, strongly adnate (kidney) in the second. The first plant differs from the second also in having the leaves cleft nearly to the base and in having the lobes strongly overlapping and coarsely dentate.*

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

‡ 204 A. *Gossypium* sp. ("Brown Mohaux," Paraguay. (South American group). Torrey Pines. Stems dark mahogany-brown, these and petioles glabrous or very nearly so. Leaves rather <sup>copiously</sup> sparsely pubescent beneath and on the pulvinus, <sup>with mostly stellate hairs,</sup> above, dark green and rather shiny above with greenish or brownish pulvinus, deeply 5-lobed, the upper lobes oblong-ovate, acuminate, the lower lobes at right angles or nearly so, basal sinus rather deep and narrow, partly or almost entirely closed by overlapping leaf margins, nectary conspicuous, round or somewhat triangular, near base of midvein and often of one or both principal lateral veins. Involucre comparatively small, shorter than the large corolla, bracts separate, very broad, with slender teeth, the involucrel nectaries very large and conspicuous, red. Calyx with undulate margin and very numerous oil glands. Petals bright yellow, conspicuously dark-spotted. Pollen orange-yellow (grade 6). Stigmas ~~from~~ slightly to long-exserted. Bolls 3- or 4-look, dark green, <sup>small,</sup> short-ovoid or nearly spherical, short pointed or nearly pointless, copiously and rather deeply pitted. Lint (as noted in 1928) when old retained with rust color. Torrey Pines, Sept. 17, 1931. Lint uniformly tawny as soon as the boll opens. Seeds fuzzy-less except for a small basal tuft of tawny fuzz.

‡ 204 B. *Gossypium* sp. "White Mohaux," Paraguay. Three plants, similar in all respects to #204 A. Lint (as noted in 1928) white. Torrey Pines, Sept. 17, 1931. Seeds similar to those of #204 A even to the tawny color of the tuft of fuzzy, although the lint is white.

GOSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

# 2050(?) *Gossypium* sp. Dooli cotton, Liberia (?) (South American group. Torrey Pines. Stems reddish-brown, these and petioles glabrous or nearly so. Leaves copiously stellate-pubescent beneath and on pulvinus and principal veins above, dark, rather dull green above, pale beneath, deeply 5-lobed, the upper lobes ovate-lanceolate, long-acuminate, midlobe often coarsely toothed, basal lobes at right angles or nearly so, basal sinus triangular, partly closed, nectary conspicuous, round, near base of the midvein and sometimes (smaller) of one of the principal lateral veins. Involucre equalling or somewhat exceeding the rather small corolla, bracts crisp, sparsely pubescent, separate, broad, deeply cordate, with numerous rather long, rather slender teeth, Calyx with undulate margin and very numerous oil glands. Petals bright yellow, conspicuously spotted, grade 7-8. Pollen orange-yellow (grade 6). Stigmas barely exerted. Bolls 4-lock, small, nearly spherical, nearly pointless, their surface shiny, copiously shallow-pitted.

(Plant removed, 1931)

GOSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#225 *Gossypium* sp. Cuba. (South American group) Torrey Pines.

Seven plants, four flowering, all very similar. Young stems and petioles sparsely pubescent with stellate hairs. Leaves tomentose beneath with short stellate hairs, rather densely pubescent but not tomentose above with similar hairs, dark green with whitish veins and pulvinus above, white beneath, very large, deeply 5-lobed, the upper lobes ovate-oblong, acuminate, the lower lobes relatively long, at right angles or slightly reflexed, sometimes with 1 or 2 very short additional lobes nearly parallel to the petiole, basal sinus deep, narrow and closed by overlapping above, broadly triangular below, nectary conspicuous, rounded-triangular, near base of the midvein and much smaller ones on both of the principal lateral veins. Involucre whitish-tomentose, bracts separate, broad, deeply cordate, with rather short and broad teeth. Calyx with undulate margin and numerous oil glands. Petals bright yellow, spotless. Pollen bright yellow (grade 5). Stigmas barely exerted. Bolls 3-4-lock, ~~much~~ shorter than the involucre, ovoid to nearly spherical, pointless or nearly so, with long, deep apical furrows, their surface shiny, very copiously shallow-pitted.

Torrey Pines Sept. 17, 1931. Apical furrows of boll (not always present) sometimes long but usually short. Bolls for plant in row 3 very pubescent, velvety to the touch even when full grown, the great majority 4-lock, extraordinarily plump, usually pointless, rarely conspicuously short-pointed.

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#229. *Gossypium* sp. Guatemala (South American group).

Torrey Pines. Stems dark reddish-brown, these and the somewhat warty petioles glabrous or very nearly so. Leaves rather ~~copiously~~ <sup>densely</sup> pubescent <sup>sparsely so on the larger veins above,</sup> beneath and on the pulvinus <sup>above with short stellate hairs,</sup> deep green with rather conspicuous light reddish-brown pulvinus, very deeply 5-lobed, the upper lobes oblong-lanceolate, attenuate acuminate, midlobe often coarsely dentate, the basal lobes rather long, more or less reflexed, basal sinus broadly triangular, sometimes closed at base, nectaries small but conspicuous, round, near the bases of the three principal veins. Involucre about equalling the large corolla, bracts separate, with numerous long teeth of medium width. Calyx deeply dentate with acutish teeth, oil glands numerous. Petals bright yellow, spotted (grade 8). Pollen orange-yellow (grade 6). Stigmas rather long. Bolls (young ones only) 3-4-loc, rather slender-ovoid, taper-pointed, shiny, copiously shallow-pitted.

Torrey Pines, Sept. 18, 1931. Bolls when full-grown are as described in 1930. Seeds covered on the lower  $\frac{1}{2}$  to  $\frac{2}{3}$  with greenish or brownish fuzzy. Lint very short, white.

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#231 A. *Gossypium* sp. Caravonica cotton, Australia (South American group). Torrey Pines. The leaves differ from those of #403 in their sparser pubescence, the hairs on both surfaces long, soft and mostly simple, in the uncolored pulvinus, lobes only 5, the basal ones at right angles or nearly so, basal sinus shallow, closed towards its base, broadly triangular below, nectary on midvein only, round-triangular or somewhat elongated. Involucre somewhat exceeding the rather small corolla, bracts separate, with numerous slender teeth. Calyx shallowly crenate with numerous oil glands. Petals bright yellow, spotted (grade 5-7). Pollen orange-yellow (grade 6). Stigmas moderately exerted. Bolls (second plant only) 3-lock, plump, ovoid, short-pointed, copiously and rather deeply pitted.

*Torrey Pines, Sept. 23, 1931. Both plants have bolls as described in 1930.*

#231 B. *Gossypium* sp. Caravonica cotton, Australia (South American group). Torrey Pines. Two plants. Leaves as in #231 A. Involucre about equalling the rather small corolla, bracts crisp, glabrous or nearly so, separate or somewhat connate, with numerous long slender teeth. Flowers as in #231 A.

*Torrey Pines, Sept. 17, 1931. Bolls 3-lock, small, ovoid, sharp-pointed, surface deeply pitted, more slender and tapering than in #231 A.*

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#231 C(?) *Gossypium* sp., Australia(?) (South American group).

Torrey Pines.

Plant in <sup>border 2,</sup> row 2.

Stems numerous, very tall, erect or ascending with long internodes, mahogany brown, soon glabrous. Petioles

<sup>sparingly</sup> pubescent with long, usually branched, mostly appressed hairs, warty.

Leaves <sup>more densely so above on the larger</sup> sparsely pubescent beneath, <sup>simple or</sup> ~~mostly~~ stellate hairs, deep green with a conspicuous reddish pulvinus,

deeply 5-lobed, upper lobes ovate-lanceolate, attenuate acuminate, lower lobes at right angles or nearly so, occasionally one or two additional very short, somewhat deflexed basal lobes, basal sinus rather shallow, open-triangular, nectary round, small but conspicuous, near base of midvein and often on one or both principal lateral veins. Involucre slightly to considerably exceeding the small corolla, bracts slightly connate with numerous rather short, slender teeth. Calyx rather short-dentate, but some of the teeth occasionally attenuate acuminate, oil glands numerous. Petals bright yellow, spotted (grade 7). Filaments long. Pollen bright yellow (grade 5). Stigmas long-exserted. Bolls 4-lock, occasionally 5-lock, ovoid, plump, abruptly short-pointed or nearly pointless, not shiny, surface copiously rather shallowly pitted (much as in Pima Egyptian).

Torrey Pines, Sept. 17, 1931. Seeds fuzz-less except for a small, sharply segregated, basal tuft of long fuzz. Lint sparse and very short, white.

GOSSYPIMUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#231 C (?) *Gossypium* sp. Australia (?) (Upland group).

<sup>border 2,</sup>  
Torrey Pines. Plant in row 3, very different from the one so-labelled  
^  
in row 2. Stems numerous, spreading, reddish-brown, very sparsely  
hirsute. Petioles reddish-brown, glabrous or nearly so. Leaves sparsely  
ciliate, otherwise glabrous, deep green with a conspicuous liver-colored  
or brighter red pulvinus, very shallowly 3-lobed with occasionally two  
^  
short teeth indicating additional lobes, the lobes triangular, acuminate,  
basal sinus open-triangular but sometimes narrowed near its base, nectery  
very small and inconspicuous, round, near base of midvein only. Involucre  
much exceeding the very small corolla, bracts very sparsely long-ciliate,  
otherwise glabrous, broad, deltoid-ovate, cordate, with rather numerous  
long and slender teeth, involucrel nectaries 2, deep and conspicuous.  
Calyx deeply and sharply dentate, the teeth occasionally greatly prolonged,  
oil glands rather numerous and very small. Petals light yellow (grade 3).  
Spotless. Pollen cream. Stigmas short. Bolls (very young) 4-lock  
with pea-green, very smooth surface, noted in 1928 as sometimes 3-lock,  
considerably longer than wide, pointed.

The characters suggest that this plant may be derived from a cross  
between *G. hirsutum* and the South American type represented by 231 D and  
the 2310 plant in row 2.

The plant labelled #501 in border 2, row 2, and an unlabelled plant  
in border 2, row 4 (near #424) seem to be the same.

Torrey Pines, Sept. 18, 1931. Bolls (apparently  
full-grown) oblong-ovoid, short-pointed  
3-4-lock, otherwise as described previously.

GOSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

# 231 D *Gossypium* sp. Australia. (South American group, although received as "native"). Torrey Pines. The four plants in row 2 and the three plants in row 4 are alike, while the plant in row 3 is rather different from the others. Stems numerous, long, decumbent or ascending, mahogany brown, these and the petioles glabrous or ~~very~~ nearly so. Leaves ~~glabrous or~~ with a very few <sup>simple or</sup> stellate hairs <sup>on</sup> ~~near~~ <sup>larger of both surfaces,</sup> bases of the veins beneath, bluish green above with a conspicuous although sometimes small reddish-brown pulvinus, not very deeply 3-5-lobed, the upper lobes ovate to oblong-ovate or ovate-lanceolate, attenuate-acuminate, the basal lobes, when present, short, acuminate, at right angles or somewhat ascending, basal sinus shallow, more or less narrowed towards its base, broadly triangular below, nectary small but sometimes rather conspicuous, nearly circular, near base of midvein only. Involucre exceeding the small corolla, sometimes considerably. Bracts separate or somewhat connate, broad with numerous long teeth, teeth slender or of medium width. Calyx deeply dentate with acute or long-acuminate teeth and numerous oil glands. Petals light yellow, spotted (grade 7). Pollen bright yellow (grade 5 or 6). Stigmas moderately to long-exserted. Bolls <sup>small,</sup> 3-5-~~lock,~~ very plump, from nearly spherical to ovoid, <sup>and</sup> tapering to a short point, dark green, rather more deeply pitted than in Pima Egyptian. Seeds, as noted in 1928, small, black, nearly naked and lint apparently white.

The plant in row 3, otherwise similar, has more erect stems, deeply 5-lobed, leaves with long basal lobes spreading at right angles, bracts with long, rather broad teeth and calyx short-dentate.

Torrey Pines, Sept. 18, 1931. The boll surface is dull but not dark. The bolls of the plants in row 4 are not "very plump." The plants in rows 2 and 3 have the seeds <sup>very</sup> less except for a small basal tuft of rather

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GOSSEYIUM AND RELATIVES AT CALIFORNIA STATIONS.

# 234 C Gossypium hirsutum Guatemala. (Mexican group).

Torrey Pines, Sept. 1930. Stems and leaves Upland-like. Involucre much exceeding the small corolla, bracts soft, pubescent, very broad, deeply cordate, with many long, broad teeth and no external nectaries. Calyx with small but sharply defined nectaries at base between the bracts. Petals pale yellow, spotless. Pollen cream. Stigmas not exerted.

Torrey Pines, Sept. 17, 1931. Bolls 3- or 4-lock, oblong-ovoid, very slender for an upland type, at least twice as long as broad, tapering from below the middle to a rather blunt tip, apical furrows long, surface Upland-like. Seeds covered (not densely) with short, white fuzz. Lint white, of good length and quality for an Upland cotton.

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GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS.

# 243 *Gossypium* sp. Caravonica cotton, Guatemala. (South American group). Torrey Pines, Sept. 1930. Three plants (the third farther along the row), the first differing in several characters from the others. Stems and petioles glabrous or nearly so. Leaves sparsely pubescent on the margins and larger veins above, more copiously so on the pulvinus and lower surface, the hairs rather long, mostly branched, leaves deep green with an uncolored pulvinus, very deeply and narrowly 5-lobed, upper lobes ovate-lanceolate, acuminate, midlobe sometimes coarsely dentate, lower lobes spreading at right angles to strongly reflexed, basal sinus shallow, closed, at least near its base, nectary small, round, very near the base of the midvein and sometimes on one of the lateral veins. Involucre shorter than to slightly exceeding the rather large corolla, bracts very broad with many slender teeth. Calyx rather deeply crenate with numerous oil glands. Petals bright yellow, spotted (grade 6-8). Pollen orange-yellow (grade 6), stigmas slightly to moderately exerted. Bolls of second and third plants 3-lock, elongated, tapering, copiously and rather deeply pitted.

(The first plant differs in its rather small corolla, nearly white petals, somewhat lighter colored pollen (grade 5), and shorter, plumper and shorter-pointed bolls).

Torrey Pines, Sept. 17, 1931. All 3 plants have the seeds fuzz-less except for a small basal tuft of brownish fuzz and very small patches elsewhere, and have white lint of moderate length. All are far inferior in size of bolls to #403, (Caravonica from San Blas, Sinaloa). The first plant differs also in its numerous 4-lock bolls, and in the occasional presence of apical furrows. The bolls of the second and third plants

GOSSEPIUM AND RELATIVES AT CALIFORNIA STATIONS.

‡ 246 B(?) *Gossypium* sp., Guatemala (?) (Mexican group).

Torrey Pines, Sept. 1930. Typical Upland in its stems and leaves, nectaries conspicuous, circular or rounded-triangular, very near the bases of all 3 principal veins.

Torrey Pines, Sept. 21, 1931. Bolls 3-lock, very small, much shorter than the involucre, ovoid, abruptly very short-pointed, surface Upland-like.

‡ 250 *Gossypium* sp., Florida (South American group). Torrey Pines,

Sept. 1930. Five plants (one farther south in the row) differing in characters of the leaves from the adjacent ‡2050 in the much less pubescence, (glabrous above, sparsely stellate-pubescent beneath), very shiny upper surface, midlobe not dentate and nectaries usually on all 3 of the principal veins. Involucre shorter than the fairly large corolla, bracts separate, with numerous rather slender teeth. Calyx margin undulate or very shallow-crenate, oil glands numerous. Petals bright yellow, spotted (grade 7-8). Sollen orange yellow (grade 5). Stigmas short-exserted. Bolls 3-4-lock, rather long-ovoid, conspicuously pointed, rather deeply pitted, the surface decidedly rough.

Torrey Pines, Sept. 18, 1931. Bolls on the first plant nearly spherical, almost pointless. Bolls of the other 4 plants as described in 1930. Seeds of first plant covered with long greenish fuzz. Lint of first plant uniformly tawny very short. Seeds of the third and fifth plants have the upper one-third to one-half devoid of fuzz. Lint of the third plant short, nearly white.

GOSSYPIMUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#259 *Gossypium* sp. Peru. (South American group). Torrey Pines.  
Petioles more or less pubescent, especially towards summit. Leaves  
white tomentose beneath with stellate hairs, densely pubescent on the  
principal veins and sparsely pubescent on the smaller veins above, light  
green, very large, not deeply 5-lobed, upper lobes ovate or oblong-ovate,  
short-acuminate, lower lobes at right angles or reflexed, basal sinus  
closed towards its base, broadly triangular below, nectaries near bases  
of the 3 principal veins, large and conspicuous, triangular or short-  
elliptical.

Torrey Pines, Sept. 17, 1931. Bracts somewhat connate,  
very broad, deeply cordate, with many rather long  
teeth! Bolls 3-lobed, long but plump, sharp-pointed,  
surface deeply pitted. Seeds about half-curved  
with white fuzz. Lint white.

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

# 269. *Gossypium* sp., Florida (South American group). Torrey Pines.

Three plants, flowers on second and third only. <sup>and</sup> Stems, petioles and  
leaves very nearly glabrous. <sup>glabrous above, very sparsely stellate-pubescent beneath,</sup> Leaves dark green and shiny above with  
a green or pale brown pulvinus, rather deeply 5-lobed, the upper lobes  
triangular-ovate, attenuate-acuminate, the basal lobes spreading at right  
angles, basal sinus not deep, closed by overlapping leaf margins for  
much of its length, nectary rather conspicuous, nearly circular, near  
the base of the midvein, often smaller ones on both of the principal  
lateral veins. Involucre shorter than the fairly large corolla, bracts  
glabrous or nearly so, separate, broad, deeply cordate, with numerous  
very slender teeth. Calyx with undulate margin and very numerous  
oil glands. Petals bright yellow, spotted (grade 8). Pollen  
orange-yellow (grade 6). Stigmas rather short. Bolls (very young)  
3-4-lobed, ovoid, pointed, the surface dark and rather shiny, copiously  
~~rather shallow-pitted.~~

Torrey Pines, Sept. 18, 1931. Well-developed bolls  
are as described in 1930 and are very sharp-  
pointed, with a distinct "shoulder." The first  
plant has a flower similar to those described  
on the other plants last year.

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#276 A *Gossypium* sp., Porto Rico. (South American group)

Torrey Pines. Two plants. Glabrous or nearly so except for sparse pubescence on the lower surface of the young leaves. Leaves dark green and shiny above with a conspicuous liver-colored pulvinus, much buckled and crinkly-margined, especially when young, very large, 5-lobed, the upper lobes ovate, attenuate-acuminate, the basal lobes at right angles or nearly so, basal sinus rather deep, narrow, often partly closed by the overlapping leaf margins, nectary small, triangular, near the base of the midvein and often on one or both of the principal lateral veins.

As noted in 1928, the bracts are large and coarsely toothed, calyx dentate with very numerous oil glands, petals yellow, spotless, pollen orange, boll 3-lock, very long (3 inches) pointed, with fairly smooth surface.

*Torrey Pines, Sept. 17, 1931. Bolls as noted in 1928. They are very slender, tapering from near base to a very long sharp point. Surface not pitted. Seeds densely covered with green fuzz. Hairs white, long and silky.*

#276 B *Gossypium* sp. Porto Rico (South American group).

One plant. Resembles #537 rather strikingly in the characters of the leaves but they are more copiously pubescent beneath, the dark brown pulvinus is more conspicuous and the basal sinus is shallower and more open. Involucre equalling or exceeding the corolla, bracts very large with numerous long, rather broad teeth. Calyx long, shallow-dentate, with very numerous oil glands. Petals bright yellow, spotted (grade 6)

Pollen yellow. Stigmas rather long.

*Torrey Pines, Sept. 17, 1931. Bolls as in # 276 A, the longest and slenderest cotton bolls I have seen.*

\* Glabrous above except on the pulvinus and larger veins where sparsely pubescent, more pubescent beneath but by no means copiously so, the hairs long, simple or branched.

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

# 285 B(?) *Gossypium* sp., Brazil(?) (Mexican group, although this number was received as *G. barbadense*). Torrey Pines. Three plants, appearing to be *G. hirsutum* in all characters, including the bolls. A very small nectary near the base of the midvein and often of one or both principal lateral veins. Involucre exceeding the very small corolla, bracts soft, somewhat pubescent, somewhat connate, with very long, rather broad teeth. Calyx deeply dentate with acute or long- and sharply-acuminate teeth, oil glands conspicuous and fairly numerous for *G. hirsutum*. Petals pale yellow, spotless. Pollen cream. Stigmas short-exserted.

Torrey Pines, Sept. 17, 1931. Bolls very small, 4-5-lobed, short-ovoid to nearly spherical, very short-pointed or pointless, some with apical furrows, surface upland-like. Seeds fuzzy-less on half or more of the surface, fuzzy white. Lint very short, white.

GOSSYPIMUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

*(not labeled)*  
# 292 *a* Gossypium sp. Philippine Islands. Originally from  
Paraguay (?) (South American group). *the first very large, the second small.*  
Torrey Pines. Two plants, <sup>A</sup>

Stems dark mahogany-brown, these and the petioles glabrous or nearly so. Leaves rather sparsely pubescent beneath and on the pulvinus above with more or less stellate hairs, dark green and somewhat shiny above with a dull, light brown pulvinus, rather thick and firm, very deeply 5-lobed (almost to base) the upper lobes oblong-lanceolate, acuminate, midlobe occasionally coarsely dentate, basal lobes long, spreading at right angles or nearly so, basal sinus rather deep, closed towards its base by the overlapping leaf margins, nectaries small but conspicuous, round or somewhat triangular, on all 3 of the principal veins. Involucre shorter than the large corolla, sometimes considerably so, bracts separate or somewhat connate with short, very slender teeth. Calyx margins undulate, sometimes with long, slender teeth, oil glands numerous. Petals bright yellow, spotted (grade 8). Staminal column long. Pollen orange (grade 7). Stigmas long-exserted. Bolls 3-4-look, short ovoid, somewhat angled, very short pointed, copiously and deeply pitted, often with conspicuous apical furrows.

(The last plant differs from the first in its prevailing 3-lobed leaves, and conspicuous deep red involucre nectaries, similar to those of #204).

*Torrey Pines Sept. 17, 1931. Seeds (of second plant) stipitate, entirely devoid of fuzz.Lint very short, white*

GOSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#296A *Gossypium* sp., Mexico. (Mexican group). Torrey Pines.  
Two plants.

Stems and leaves of *G. hirsutum*. Involucre exceeding the very small corolla, bracts of rather crisp texture for *G. hirsutum*, somewhat connate, broad and very deeply cordate, with rather numerous, rather short and rather narrow teeth. Calyx deeply dentate with very acute or sharp acuminate teeth, oil glands fairly numerous and conspicuous. Petals pale yellow, spotless. Pollen cream (?) Stigmas long. Bolls, as noted in 1928, 5-lobed, small, rounded, very smooth. (Resembles some of the Kearney and Collins plants, #396-415).

*Torrey Pines, Sept. 17, 1931. Bolls usually 4-lobed, small, ovoid, very short-pointed or nearly pointed, with short apical furrows. Seeds with a conspicuous basal tuft of rather long white fuzz. Hairs short and sparse, white.*

#300 *Gossypium* sp., Mexico (Mexican group). Torrey Pines.

Two plants, one flowering. Very similar to *G. hirsutum*. Stems and petioles densely pilose. Leaves copiously stellate-pubescent beneath and on the pulvinus above, more sparsely so and with mostly simple hairs along the veins above, the midlobe rather long for *G. hirsutum*. Calyx with long, very slender teeth. Petals spotless. Pollen yellowish (grade 3?)

*Torrey Pines, Sept. 18, 1931 Bolls (of first plant) very small, shorter than the involucre 3-lobed, ovoid, rather slender, short-pointed, surface upland-like. Bolls (of second plant) very different, small 3-4-lobed, ovoid, very blunt, usually conspicuously sharp-pointed, often with apical furrows, surface dark green, shiny, copiously and deeply pitted.*

GOSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

# 331 Gossypium barbadense, Sea Island cotton from Panama  
(South American group). Torrey Pines. One plant, very small.  
Resembles #332 in leaf characters. Involucre much shorter than the  
large corolla, bracts crisp, glabrous or nearly so, with rather numerous,  
very slender teeth. Calyx margin undulate, oil glands rather numerous.  
Petals light yellow, spotted (grade 7-8). Pollen grade 5. Stigmas  
long.

(Plant died, 1931)

# 332 Gossypium barbadense, Sea Island cotton from Virgin Islands  
(South American group). Torrey Pines. Two plants, Stems glabrous,

very sparsely stellate-pubescent and  
petioles nearly so, warty.  
and on the margins  
or branched hairy

very nearly glabrous above, stellate-  
Leaves soft-pubescent beneath with simple

deep green above with light brown pulvinus, pale beneath,  
deeply lobed, lobes usually 3 but sometimes 4, apparently never 5, oblong-  
lanceolate or ovate-lanceolate, attenuate-acuminate, basal sinus shallow,  
triangular, usually shallow and often closed near base, nectary small,  
round-triangular, near base of midvein and sometimes on one of the principal  
lateral veins. Involucre exceeding the rather small corolla, bracts crisp,  
smooth, separate or somewhat connate, with very numerous long teeth of medium  
width. Calyx deeply crenate with numerous oil glands. Petals bright  
yellow, spotted (grade 7). Pollen orange-yellow (grade 6). Stigmas  
well-exserted but not long for Sea Island. Bolls 3-lock, slender, tapering  
to a very sharp point, surface shining and deeply pitted.

(Plants died, 1931)

23 a

*Gossypium and Relatives.*

#339 Thespesia lampas, India. Washington, D.C. (greenhouse)

November 2, 1931. A tall shrub with light brown bark. Petioles densely pubescent with short branched hairs. Leaves dull olive-green above with a pulvinus of the same color, yellowish beneath, pubescent on both surfaces but especially the lower with short, branched hairs, shallowly 3-lobed, the lobes broadly triangular-ovate, acuminate, nectary near base of midvein only, prominent, nearly circular. Involucral bracts widely separate, subulate, shorter than or barely equalling the undivided part of the calyx, to which they are appressed. Calyx without conspicuous oil glands, its teeth subulate, about equalling the undivided portion of the calyx and the involucral bracts. Petals about 5 cm. long, crinkle-margined, bright yellow (grade 5) with dark mahogany red spots covering the whole surface of the claw and about  $1/5$  the area of the petal. Staminal column long with numerous stamens borne nearly to its base. Pollen orange-yellow (grade 6). Pistil (stigmas and exerted portion of the style) nearly equalling the column, the stigmas much shorter than the style and united.

GOSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

# 334 *Gossypium* sp., Costa Rica (Mexican group). Torrey Pines.

One plant, *G. hirsutum* in all vegetative characters.

(Plant died, 1931)

# 351 *Gossypium brasiliense* (?) Kidney cotton, Brazil. (South American group). Torrey Pines. Three plants, the last two erroneously labelled as #360. Stems nearly glabrous, petioles sparsely pubescent, somewhat warty. Leaves copiously soft-pubescent, almost tomentose, beneath and on pulvinus above, <sup>with</sup> hairs rather long, ~~often branched but not stellate,~~ <sup>mostly</sup> ~~stellate,~~ <sup>hairs</sup> dark green and somewhat shiny with a dull brown pulvinus above, whitish beneath, very deeply 5-lobed, the upper lobes ovate-lanceolate, long-acuminate, midlobe often coarsely toothed, the basal lobes at right angles, basal sinus closed at base, open-triangular below, nectaries conspicuous, round-triangular, usually on all 3 principal veins. Involucre not quite squalling the corolla, bracts crisp, separate or somewhat connate, teeth rather short and of medium width. Calyx dentate with acutish to very acute teeth and numerous oil glands. Petals bright yellow, spotted (grade 6-8). Staminal column long. Pollen orange-yellow (grade 6). Stigmas long. Bolls 3-4-loc, <sup>to a very sharp point,</sup> tapering, <sup>^</sup> the surface dark, shiny, copiously and rather deeply pitted, noted in 1928 as having conspicuous apical furrows.

Torrey Pines, Sept. 18, 1931. apical boll furrows only occasionally present. Seeds (of third plant) strongly coherent (Kidney) fuzz-less except for a small tuft at base and a little along the raphe, occasionally with a small patch near the apex. Lint abundant, short, white.

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#358 *Gossypium* sp., French Somaliland, (South American group).

Torrey Pines. Three plants. Stems and petioles glabrous or nearly so. Leaves sparingly pubescent beneath and on pulvinus above, less persistently so on the veins above, bright green becoming dark green above with pulvinus only slightly colored, deeply lobed, lobes usually 7, the upper lobes oblong-ovate, long-acuminate, the 4th and 5th lobes at right angles, the 6th and 7th lobes short, at right angles or more or less deflexed, basal sinus very deep and narrow, usually more or less closed by overlapping leaf margins, nectaries conspicuous, round or triangular, on the 3 principal veins.

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#364 *Gossypium* sp., Abyssinia (South American group).

Torrey Pines. Stems and petioles glabrous or nearly so, the petioles slightly warty. Leaves rather copiously pubescent beneath and on pulvinus above with long, soft hairs, dark green and somewhat shiny above, pale beneath, very deeply 5-lobed, the upper lobes ovate, long-attenuate-acuminate, the basal lobes long, at right angles, basal sinus deep, closed near base, open-triangular below, nectary of midvein rather large, elliptical, smaller ones often present on one or both principal lateral veins. Involucre nearly equalling the long corolla, bracts crisp, nearly glabrous, broad, with numerous long, slender teeth and small but sharply defined nectaries. Calyx with undulate margin, very numerous oil glands, and one very small nectary at its base. Petals bright yellow, spotted (grade 8+). Pollen orange yellow (grade 6). Stigmas rather long. Bolls very young but evidently typical South American.

Torrey Pines, Sept. 18, 1931. Well-developed bolls 3-4. loc, ovoid, rather short, very plump, short-pointed, surface dark green, copiously but not deeply pitted.

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#366 Gossypium <sup>*brasiliense?*</sup> sp. Paraguay (South American group). Torrey Pines.

Four plants. Stems and petioles glabrous or nearly so. Leaves rather densely pubescent beneath and on pulvinus above, sparsely so on veins above, <sup>with rather long *scabrate* stellate hairs</sup> long, bright green becoming dark green with a greenish pulvinus above, very large, deeply 5-lobed with occasionally a 6th very short, deflexed basal lobe, the upper lobes ovate-oblong, attenuate-acuminate, midlobes often coarsely toothed, the lower lobes at right angles or nearly so, basal sinus narrowly to widely triangular, usually closed near apex, nectaries round-triangular, conspicuous, near the base of all 3 principal veins. Involucre from nearly equalling to slightly exceeding the rather large corolla, bracts large, separate or somewhat connate, with numerous rather broad teeth. Calyx with undulate or shallowly crenate margin <sup>one or more teeth</sup> (sometimes attenuate-acuminate) and very numerous oil glands. Petals bright yellow, spotted (grade 7). Pollen orange (grade 7). Stigmas slightly to considerably exserted. Bolls, as noted in 1928, 3-lock, long- and sharp-pointed, apical furrows conspicuous, surface deeply pitted.

Torrey Pines, Sept. 17, 1931. Seeds coherent (kidney) fuzz-less except for a small basal tuft. Hint white. — C. G. Marshall believes this plant to be a hybrid, the petals being spotted and the seeds less strongly coherent than in typical kidney cotton which, he states, has spotless petals. (C. B. # 673, for example, has spotless petals and strongly coherent seeds.)

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

# 367. Gossypium hirsutum, Transvaal (Mexican group). Torrey Pines.  
Is G. hirsutum in all characters. Leaf nectary very small, circular  
or very short elliptical, near base of the midvein only or occasionally  
on one of the principal lateral veins. Calyx extraordinarily long  
with very long-acuminate slender teeth and few oil glands. Petals  
nearly white, spotless. <sup>Pollen nearly colorless.</sup>  
~~Pollen pale yellow (grade 4).~~

Torrey Pines, Sept. 18, 1931. Bolls large, 4-5-lobed, ovoid,  
very short-pointed, frequently with long, apical furrows  
surface upland-like. Seeds covered with long, greenish-  
white fuzz. Lint short, white.

# 368 Gossypium hirsutum, Transvaal. Resembles #367 in  
all characters. Leaves pubescent on the petiole, pulvinus and principal  
veins of both surfaces, sparsely so elsewhere on the lower surface, hairs  
long, simple or branched.

Torrey Pines, Sept. 18, 1931. Bolls longer and  
more pointed than in # 367, otherwise similar.

GOSSEYIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

# 376 *Gossypium* sp., Paraguay (South American group)

Torrey Pines. Four plants. Stems and petioles glabrous or nearly so. Leaves densely pubescent with stellate hairs beneath, only on the veins and pulvinus above, dark green above, very deeply 5-lobed, the upper lobes very long, oblong-lanceolate, long-acuminate, midlobe often coarsely toothed, the lower lobes reflexed, basal sinus broadly triangular but closed towards its base, nectary nearly circular or short-elliptical, near base of midvein only. Involucre from much shorter than to about equalling the large corolla, bracts nearly separate or somewhat connate, with rather slender teeth. Calyx margin undulate or shallow-crenate, oil glands numerous. Petals bright yellow, spotted (grade 8). Pollen orange yellow (grade 6). Stigmas from barely- to long-exserted. Bolls, as noted in 1928, 3-4-lock, round, short-pointed, surface shiny, deeply pitted.

Torrey Pines, Sept. 17, 1931. Bolls short-ovoid, plump. Seeds fuzz-less except for a small basal tuft and a little along the raphe. Lint buff.

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#378 *Gossypium* sp., Abyssinia (Asiatic group) Torrey Pines.

Two plants, resembling *G. obtusifolium* and *G. herbaceum*. Stems and petioles dark brown, densely villous. Leaves copiously soft-pubescent (almost tomentose) beneath with long mostly simple hairs on the veins and shorter mostly stellate hairs between, sparingly so above, yellowish becoming deep green above with a small dark-brown pulvinus, scarcely longer than broad, 5-lobed, the lobes broadly ~~ovate~~, rather abruptly short-acuminate and cuspidate, the upper lobes somewhat narrowed towards base, the lower lobes at right angles or nearly so and often themselves short-lobed, basal sinus very shallow and very open-triangular, nectary small, circular, near base of midvein only. Pedicels short, declined long before anthesis. Involucre from considerably shorter than to about equalling the small corolla, bracts soft, very pubescent, from rather strongly to very strongly connate, with rather numerous (for an Asiatic) fairly long, broad teeth. Calyx irregularly shallow-crenate or regularly very short-dentate, oil glands rather few but very conspicuous, black. Petals light yellow with very large, intensely colored, crimson spots. Pollen orange (grade 7). Stigmas barely exerted.

Torrey Pines, Sept. 18, 1931. Bolls 3-lobed, small, ovoid, conspicuously and abruptly pointed, the faces of the lobes concave towards apex, surface light green, very smooth and shiny. Involucral bracts with 7 to 11 teeth that are long for an Asiatic cotton. Petals crinkle-margined, their spots occupying about  $\frac{1}{4}$  the area of the petal. Stigmas sometimes well-exserted. Seeds completely covered with short, greenish fuzz. Lint short, sparse, white.

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#380 *Gossypium* sp., Abyssinia. Torrey Pines. So-labelled  
but seems to be identical in all respects with the plant in row 3  
labelled #231C.

#381 *Gossypium herbaceum*, Turkestan (Asiatic group). Torrey Pines.

Plant very small but seems typical *herbaceum*.

*Torrey Pines, Sept. 23, 1931. Boll (only one) 3-lobed, very small, nearly spherical, abruptly sharp-pointed. Seeds densely covered with short, white fuzz. Lint short, white.*

#382 *Gossypium* sp., San Domingo. Torrey Pines. One very  
small plant, apparently the same as #384.

Note made in 1928. Whole plant dark purple, rather pubescent.  
Leaves deeply and narrowly 5-lobed. Involucral bracts with few slender  
teeth. Calyx dentate with very short, broadly triangular teeth and  
few oil glands. Corolla small, petals pale yellow, spotless. Pollen  
deep yellow. Stigmas very long. Apparently identical with #384

*Torrey Pines, Sept. 18, 1931. Boll (only one) small 3-lobed, ovoid, abruptly and sharply short-pointed, surface shiny, deeply pitted.*

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

*barbadense* x *purpurascens*?  
#384 *Gossypium* sp., San Domingo (South American group).

Torrey Pine. One plant. Stems black, glabrous or nearly so. Petioles dark purple-brown, prominently warty, <sup>nearly</sup> glabrous. Leaves rather copiously pubescent beneath, especially along the veins, with short stellate hairs, also on the pulvinus and principal veins above, dark purplish green above with dark brown-purple pulvinus and pink larger veins, rather small, deeply 5-lobed, the upper lobes ovate-lanceolate, acuminate, the lower lobes at right angles, basal sinus triangular, usually closed near base, nectary deep and very prominent, circular, black, near base of midvein and often on one of the principal lateral veins. (Nectary similar except in being short elliptical in #671 *G. purpurascens*). Involucre about equalling the corolla, bracts crisp, dark purple, separate or slightly connate, with few long slender teeth. Calyx margin crenate, oil glands numerous. Petals bright yellow, spotless. Pollen bright yellow (grade 5). Stigmas well-exserted. Bolls 3-lock, long-ovoid, plump, tapering to a very sharp point, dark green and more or less purple like rest of the plant, very shiny, their surface rough with deep pits.

Torrey Pine Sept. 18, 1931. Bolls much as in #382 but larger, 3-4-lock, oblong-ovoid, often with well-developed apical furrows. Seeds large (long yet fairly plump) fuzz-less except for a very small basal tuft of green fuzz. Lint white, silky, rather short.

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#387 Gossypium sp., San Domingo (Mexican x South American ?)

Torrey Pines. Four plants, showing resemblance to #384, only 3 of them flowering. Stems dark brown becoming nearly black, glabrous. Petioles dark brown, sparsely pubescent, warty. Leaves <sup>nearly above,</sup> glabrous or <sup>very</sup> sparsely stellate-pubescent ~~on the veins~~ beneath, dark purplish green with nearly black pulvinus and deep red-purple veins above, rather shallowly and very broadly 3-5-lobed (mostly 3-lobed) the upper lobes broad-ovate, obtuse and mucronate, <sup>or</sup> very short-acuminate, basal lobes when present at right angles or nearly so, basal sinus broadly triangular but narrow or closed near base, nectary small but rather deep and prominent, circular or rounded-triangular, near base of midvein and often on one or both principal lateral veins. Involucre shorter than to exceeding the small corolla, bracts crisp, glabrous or nearly so, purple, somewhat connate, with conspicuous basal nectaries, teeth slender to rather broad. Calyx deeply dentate with triangular acute or acuminate teeth and rather numerous oil glands. Petals pale yellow, spotless. Pollen pale yellow or cream. Stigmas slightly to well-exserted. Bolls (second plant) 3-4-lobed, plump, ovoid, tapering to a rather long sharp point, with long and deep apical furrows, the surface light green but rough with rather deep pits (Very young boll on third plant seems to be similar).

The first and fourth plants differ in having the leaves mostly 5-lobed, <sup>lobes</sup> more narrowly ovate and long-acuminate, calyx only slightly crenate and boll with smoother surface.

Torrey Pines, Sept. 18, 1931. Well-developed bolls (on plants 2, 3 and 4) correspond to the description. <sup>made in 1930 except that the point is rather short</sup> <sup>the surface is bluish green and dark purple</sup> <sup>pits shallow</sup>

GOSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#393. Gossypium Nanking, Million Dollar variety, China (Asiatic group). Torrey Pines. Several plants in orchard, which differ as follows from #430 G. indicum in Border 2. \* Leaves larger and somewhat more deeply lobed, larger involucre and corolla, calyx about twice as long with oil glands larger but not much more numerous hence appearing more scattered, stigmas much less exerted, boll nearly 3 times as long. Pedicels short or rather long, very strongly declined (pendent) at and after anthesis, often so long before anthesis. The bolls of the several Nanking plants in the orchard vary from short-ovoid and very abruptly pointed to rather long-ovoid and more tapering, the point always sharp.

In all other characters these Nanking plants correspond closely with ~~the description of~~ G. indicum and the differences are hardly more than varietal.

# 430 labelled  
Torrey Pines, Sept. 19, 1931. Seeds densely covered with white fuzz; lint short, white.

\* In #393 the petioles are densely stellate-puberulent and villous with long simple hairs as are also the larger veins, especially beneath, the rest of both leaf surfaces rather densely pubescent with very short,

Sept. 17, 1930

GOSYPIUM FROM SONORA AND SINALOA (KEARNEY & COLLINS)  
AS GROWN AT TORREY PINES, BORDER 2, ROW 1. 1930.

(Notes on seed and lint characters made November 4, 1926)

#396 (KC 16) Three plants, one in border 1 row 2. Stems numerous, *villous with very long hairs.* Erect or ascending. Stems and petioles ~~hirsute~~. Leaves when young very *(the larger veins of both surfaces with long simple or branched hairs)* pubescent on both surfaces, the older ones on ~~veins~~ beneath, light green with rather dull reddish-brown pulvinus, somewhat longer than broad, deeply 5-lobed, the upper lobes long-acuminate, often coarsely dentate, the basal lobes horizontal, basal sinus open, triangular, with a very small, sharply defined, nearly round nectary on the midvein only. Involucre somewhat exceeding the corolla, Upland-like, the bracts nearly separate or moderately connate, sparsely hairy on veins, the teeth rather numerous, conspicuously ciliate, very long, of medium width, ~~conspicuously ciliate~~, the middle one occasionally itself dentate, external nectaries usually wanting. Calyx with long, setose teeth and rather numerous oil glands. Petals nearly white or light yellow, spotless. Pollen cream. Stigmas long. Bolls 3- or 4-lobed, short, nearly spherical, plump, abruptly and conspicuously sharp-pointed, occasionally with apical furrows, the surface smooth. Seeds naked, stiped. Lint very short, rather sparse, white.

Riverside (Sept. 26) Four plants. Three are flowering and have nearly white, spotless petals. Three have open bolls with very nearly naked seeds and white lint.

Note made in Mexico, Sept., 1924. Buds and young stems densely pubescent. Said to grow wild on coast of Gulf of California near Cajeme, Sonora.

1/ Leaf-lobation, etc., noted on well-developed leaves of the axis.

GOSSYPIUM FROM SONORA AND SINALOA (HEARNEY & COLLINS)  
AS GROWN AT TORREY PINES, BORDER 2, ROW 1, 1930.

(Notes on seed and lint characters made November 4, 1926)

#397 (KC 4) Two plants. Stems numerous, erect or ascending. Stems and petioles hirsute. Leaves pubescent along veins beneath, much less pubescent than in #396, light green with bright reddish-brown pulvinus, much less deeply lobed than in #396, 3-lobed or with 2 additional short, ascending lobes, the upper lobes short-acuminate, basal sinus open, triangular, nectary as in #396. Involucre Upland-like, exceptionally large, much exceeding the corolla, the bracts hardly connate, the teeth rather numerous, conspicuously ciliate, long and broad (broader than in #396) the terminal tooth often with one or two rather long teeth, external nectaries usually present and conspicuous. Calyx long-dentate and with comparatively few oil-glands. Petals nearly white, spotless. Pollen very pale yellow. Stigmas long. Bolls 3- or 4-locked, ovoid, short pointed, smooth, but with numerous, rather conspicuous oil glands. Seeds less stipitate than in #396 and with a little tuft of very short fuzz at base. Lint as in #396.

Seeds (original collection in Mexico) naked except for a minute basal tuft of fuzz.

GOSSYPIUM FROM SONORA AND SINALOA (KEARNEY & COLLINS)  
AS GROWN AT TORREY PINES, BORDER 2, ROW 1, 1930.

(Notes on seed and lint characters made November 4, 1926)

#398 (KC 2) Two plants. Stems numerous, erect or ascending. Stems and petioles hirsute. Leaves similar to those of #396 but somewhat darker green, persistently villous along veins beneath. Involucre upland-like, from somewhat shorter to somewhat longer than the corolla, the bracts more or less connate, their teeth as in #396, external nectaries present. Calyx with long teeth and rather numerous and conspicuous oil glands. Petals very pale yellow, spotless. Pollen cream. Stigmas long. Bolls 3- or 4-lobed, ovoid or oblong-ovoid, more pointed than in #396 and #397, smooth but with conspicuous oil glands. Seeds and lint as in #397.

Note made in Mexico, Sept., 1924. Flowers rather small with pale yellow, spotless petals. Stigmas somewhat exceeding the stamens. Bracts somewhat connate. Leaves and stems hairy. Los Mochis, Sinaloa.

Seeds (original collection in Mexico) with a rather large basal tuft of brownish (originally greenish ?) fuzz.

GOSSYPIUM FROM SONORA AND SINALOA (KEARNEY & COLLINS)  
AS GROWN AT TORREY PINES, BORDER 2, ROW 1, 1930

(Notes on seed and lint characters made November 4, 1926)

#399 (KO 5) One plant. Stems tall, erect or spreading, internodes long. Stems and petioles hirsute but less so than in #398. Leaves less pubescent than in #398, soon glabrate, dark green (much darker than in #398) with a not conspicuous, dull reddish-brown pulvinus, rather shallowly 5-lobed, the basal lobes more or less ascending, the upper lobes rather broad, short-acuminate, the basal sinus narrow or nearly closed, nectary as in #396. Involucre upland-like, much longer than the very small corolla, the bracts separate (freer than in any other of this series) their teeth shorter, broader and shorter-ciliate than in #396, the terminal <sup>tooth</sup> itself often coarsely toothed, the external nectaries not conspicuous. Calyx long-dentate, with comparatively few oil glands. Petals pale yellow, intensely spotted (grade 8). Pollen cream. Stigmas long. Bolls 3-5, mostly 4-lock, very plump, short-ovoid, abruptly but decidedly pointed, smooth but with conspicuous oil glands. Seeds with a little very short greenish fuzz at base. Lint as in #396.

Note made in Mexico, Sept. 1924. Petals with conspicuous spots. In park at Hermosillo, Sonora.

Seeds (original collection in Mexico) with fuzz at the base and often extending a little way up the sides, less than in #398 but more than in #397. Fuzz rufous in the old specimen.

GOSSYPIUM FROM SONORA AND SINALOA (KHEARNEY & COLLINS)  
AS GROWN AT TORREY PINES, BORDER 2, ROW 1, 1930.

(Notes on seed and lint characters made November 4, 1926)

#400 (KC 6). Two plants, more compact and smaller than most of this series. Stems and petioles very hirsute. Leaves somewhat pubescent on the veins beneath, dark green with a dull reddish-brown pulvinus, small, rather shallowly 5-lobed, the short basal lobes more or less ascending, the upper lobes broad, acuminate, ~~the basal lobes short, ascending,~~ the basal sinus open, triangular, nectary as in #396. Involucre upland-like, exceeding the corolla, comparatively smooth, the bracts somewhat connate, their teeth not conspicuously ciliate, few and rather short, the external nectaries fairly conspicuous. Calyx with long teeth and fairly numerous oil glands. Petals pale yellow, spotless. Pollen cream. Stigmas short. Bolls 3- or 4-lock, round, very short-pointed, smooth. Seeds and lint as in #399.

Note made in Mexico, Sept., 1924. Petals spotless. Cocorit, Sonora. Seeds (original collection in Mexico) with a large basal tuft of long (originally greenish?) fuzz often extending a little way up the sides.

34 f  
-8-

GOSSYPIUM FROM SONORA AND SINALOA (KEARNEY & COLLINS)  
AS GROWN AT TORREY PINES, BORDER 2, ROW 1, 1930

(Notes on seed and lint characters made November 4, 1926)

#401 (KC 13) Two plants, of open habit, the stems rather short and spreading. Stems and petioles hirsute. Leaves very pubescent beneath, rather dark green with a reddish-brown pulvinus <sup>that is</sup> somewhat brighter-colored than in #400, rather deeply 5-lobed, the upper lobes long-acuminate, the basal lobes horizontal or somewhat ascending, basal sinus from deep and narrow to open, triangular, the nectary as in #396. Involucre Upland-like, exceeding the very small corolla, the bracts separate or nearly so, their teeth as in #396, the external nectaries rather conspicuous. Calyx deeply toothed, the teeth with long but hardly setose points or merely acute, oil glands rather numerous and conspicuous. Petals nearly white, spotless. Pollen very pale yellow. Stigmas long. Bolls 3- or 4-look, short ovoid, short pointed or almost pointless, smooth but with conspicuous oil glands. Seeds naked except for a conspicuous tuft of rather long fuzz at base. Lint white, short and rather sparse.

Seeds (original collection in Mexico) similar to those of #400 but the area of fuzz larger and the fuzz hairs longer, probably originally white.

GOSSYPIMUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#396-401 and 404-415. *Gossypium* sp., Mexico (Mexican group).

Torrey Pines. Characters recorded elsewhere. Are the Kearney and Collins collection from Sonora and Sinaloa.

#403 *Gossypium* sp. Caravonica cotton, Mexico (South American group).

Torrey Pines. Four plants. Young stems and petioles sparsely stellate-pubescent. Leaves ~~rather~~ <sup>almost tomentose</sup> densely pubescent beneath and on veins and pulvinus above, the hairs mostly stellate, <sup>^</sup> beneath, ~~simple~~ <sup>2/</sup> above, large, deeply 5-7-lobed, the upper lobes oblong-ovate, attenuate-acuminate, the 4th and 5th lobes at right angles or nearly so, the 6th and 7th lobes (only occasional) very short, deflexed, basal sinus deep, usually very narrow or closed by overlapping, nectaries small, circular or rounded-triangular, near bases of the 3 principal veins or sometimes on the midvein only. Involucre shorter than to slightly exceeding the very large corolla, bracts separate, very broad, with numerous rather long and slender teeth. Calyx margin from undulate to dentate with long-acuminate teeth, oil glands many. Petals bright yellow, spotted. (grade 7-8). Pollen orange yellow (grade 6). Stigmas from barely to moderately exerted. Bolls, as noted in 1926, 3-lock, long-pointed, deeply pitted.

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1/ Is this a general tendency in the South American group?

35a  
-7-

GOSSYPIMUM FROM SONORA AND SINALOA (KEARNEY & COLLINS)  
AS GROWN AT TORREY PINES, BORDER 2, ROW 1, 1930

(Notes on seed and lint characters made November 4, 1926)

#404 (KC 12) One plant. Stems rather short, spreading. Stems and petioles rather sparsely hirsute. Leaves pubescent only on the veins when young, soon glabrate, light yellowish-green with a dull, dark-brown pulvinus, rather shallowly 5-lobed, ~~the basal lobes more or less ascending~~, the upper lobes long-acuminate, the basal lobes more or less ascending, basal sinus rather deep and narrow, the nectary as in #396. Involucre Upland-like, equalling to considerably exceeding the very small corolla, the bracts distinctly connate with few, rather slender teeth, nearly glabrous except the rather short-ciliate teeth, the external nectaries often conspicuous. Calyx long-toothed, oil glands few but conspicuous. Petals very pale yellow, spotless. Pollen very pale yellow. Stigmas long. Bolls 3- or 4-lock, short ovoid, abruptly sharp-pointed, smooth but with conspicuous oil glands. Seeds hardly stipitate, naked except for a very small tuft of very short greenish fuzz at base. Lint very short and sparse, white.

Seeds (original collection in Mexico) naked except for a small, sharply-defined basal tuft of fuzz.

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GOSYPIUM FROM SONORA AND SINALCA (KEARNEY & COLLINS)  
AS GROWN AT TORREY PINES, BORDER 2, ROW 1, 1930.

(Notes on seed and lint characters made November 4, 1926)

#405 (KC 11). Two plants. Stems rather short, spreading. Stems and petioles strongly hirsute. Leaves very pubescent beneath when young, dark bluish-green (about 3 grades darker than the adjacent #404) with a dull reddish-brown pulvinus, rather deeply 5-lobed, the upper lobes long-acuminate, occasionally coarsely dentate, the basal lobes short, horizontal or ascending, basal sinus triangular, often narrow or closed, the nectary as in #396. Involucre Upland-like, equalling to considerably exceeding the rather small corolla, the bracts hardly connate, their teeth conspicuously ciliate, numerous, long and very broad, hardly connate, the external nectaries conspicuous. Calyx deeply toothed with very acute or sharply acuminate teeth, oil glands rather numerous and conspicuous. Petals nearly white, spotless. Pollen very pale yellow (grade 3). Stigmas long. Bolls 3- or 4-lock, short-ovoid, abruptly short-pointed, smooth but with conspicuous oil glands. Seeds with a conspicuous tuft of rather long, whitish fuzz at base. Lint short and sparse, white.

Seeds (original collection in Mexico) with a large basal tuft of long, whitish fuzz which occupies about 1/4 of the seed surface.

GOSSYPIMUM FROM SONORA AND SINALOA (KEARNEY & COLLINS)  
AS GROWN AT TORREY PINES, BORDER 2, ROW 1, 1930.

(Notes on seed and lint characters made November 4, 1926)

#406 (KC 1). One plant, of open habit, stems spreading, internodes long. Stems and petioles more sparsely hirsute than any other of this series, these and the exposed surfaces of the involucre <sup>in</sup> bright mahogany-colored. Leaves soon glabrous above, persistently pubescent on veins beneath, deep bluish-green with a dull, dark reddish-brown pulvinus, deeply 5-lobed, the upper lobes long-acuminate, the basal lobes very short, horizontal or somewhat ascending, basal sinus open, triangular. Nectary as in #396. Involucre Upland-like except in being very nearly glabrous, from shorter than to slightly exceeding the comparatively large corolla, the bracts slightly connate, their teeth almost hairless, fairly numerous, rather long, slender, external nectaries apparently none. Calyx dentate with acute to long setose teeth, oil glands rather few but conspicuous. Petals light yellow with large, intensely colored spots (grade 10). Pollen cream. Stigmas long. Bolls 3- or 4-look, short ovoid, abruptly short- or rather long-pointed, smooth with few but conspicuous oil glands. (No description of seeds and lint).

Note made in Mexico, Sept., 1924. Brown-linted. Near San Blas, Sinaloa. The herbarium specimen collected in Mexico shows the stems and leaves glabrous except when very young.

Seeds (original collection in Mexico) as in #406 but the fuzz rufous (originally greenish?)

35d  
-16-

GOSSYPIUM FROM SONORA AND SINALOA (KEARNEY & COLLINS)  
AS GROWN AT TORREY PINES, BORDER 2, ROW 1, 1930.

(Notes on seed and lint characters made November 4, 1926)

#407 (KC 21). Two plants, rather compact, the stems erect. Stems and petioles densely hirsute. Leaves soon glabrate above, persistently pubescent on veins beneath, rather bright green (at least 2 grades lighter-colored than the adjacent #406) with a dull dark reddish-brown pulvinus, shallowly 5-lobed, the upper lobes broad, very short-acuminate, the basal lobes horizontal or somewhat ascending, basal sinus deep, rounded or triangular, the nectary elongated with occasionally a smaller one on one of the lateral veins. Involucre squalling or slightly exceeding the corolla, the bracts separate or slightly connate, their teeth few, rather short and broad, short-ciliate, the external nectaries conspicuous. Calyx deeply dentate with very long and sharply acuminate teeth, oil glands rather few but conspicuous. Petals light yellow with weak to fairly intense spots (grade 7.5). Pollen cream. Stigmas rather long. Bolls 3- or 4-loc, globular or ovoid, having abrupt short points on the first plant and rather long, very sharp points on the second plant, smooth with few and not conspicuous oil glands. Seeds scarcely stipitate, having a conspicuous tuft of greenish fuzz at base. Lint sparse, exceptionally short, white.

Note made in Mexico, Sept., 1924. Young stems, petioles and leaf veins rather sparsely hirsute with long hairs. Petals with a small, pale spot. Near Los Mochis, Sinaloa.

Seeds (original collection in Mexico) with fuzz similar in length and distribution to those of #405, fuzz probably originally greenish.

GOSSYPIMUM FROM SONORA AND SINALOA (KEARNEY & COLLINS)  
AS GROWN AT TORREY PINES, BORDER 2, ROW 1, 1930.

(Notes on seed and lint characters made November 4, 1926)

#408 (KC 20) Two plants, small and compact. Stems and petioles decidedly hirsute. Leaves small, very pubescent beneath when young, their color similar to that of #407 but the pulvinus much smaller and lighter brown, deeply 5-lobed, the upper lobes acuminate, the basal lobes horizontal or nearly so, basal sinus narrowly triangular, the nectary as in #396 with occasionally one on a lateral vein. Involucre exceeding the corolla, the bracts from nearly separate to decidedly connate, the teeth as in #396 but possibly fewer and broader, the external nectaries conspicuous. Calyx dentate with long teeth, oil glands rather numerous and conspicuous. Petals nearly white with large, intensely colored spots (grade 9-10). Pollen cream. Stigmas slightly to moderately exserted. Bolls 3- or 4-lobed, short ovoid or nearly globular, abruptly very short-pointed to fairly long-pointed, very smooth but with numerous, rather conspicuous oil glands. Seeds scarcely stipitate, having a rather conspicuous basal tuft of short yellowish fuzz. Lint short and sparse, white.

Note made in Mexico, Sept., 1924. Plant very hairy. Petals spotted. Stigmas very short. Los Mochis, Sinaloa.

Seeds (original collection in Mexico) with a small but conspicuous basal tuft of brownish fuzz.

COSSYPIUM FROM SOFORA AND SINALOA (KEARNEY & COLLINS)  
AS GROWN AT TORREY PINES, BORDER 2, ROW 1, 1930.

(Notes on seed and lint characters made November 4, 1926)

#409 (KC 19). Two plants of very open habit, with long internodes, stems more erect than in most of this series. Stems and petioles very hirsute. Leaves moderately pubescent beneath, soon glabrate above, much darker colored than those of the adjacent #408 with a dull dark reddish-brown pulvinus, mostly only 3-lobed, the lobes short, broad, merely acute, the basal sinus narrowly to broadly triangular, the nectary as in #396. Involucre from somewhat shorter than to exceeding the corolla, the bracts separate to decidedly connate, their teeth as in #396, the external nectaries small but rather conspicuous. Calyx dentate with long teeth, oil glands rather numerous and conspicuous. Petals pale yellow, spotless. Pollen cream. Stigmas moderately exerted. Bolls 3- or 4-locked, short ovoid or nearly globular, abruptly very short pointed, smooth but with conspicuous oil glands. Seeds with a small but conspicuous basal tuft of rather long, greenish-brown fuzz. Lint short and sparse, white.

Note made in Mexico, Sept., 1924. Plant very hairy. Petals spotless. Stigmas long. Bracts slightly connate. Los Mochis, Sinaloa.

Seeds (original collection in Mexico) with a large basal tuft of very long, apparently white fuzz, the whole seed surface often covered with shorter greenish fuzz.

35 g  
-18-1

GOSSYPIUM FROM SONORA AND SINALOA (KEARNEY & COLLINS)  
AS GROWN AT TORREY PINES, BORDER 2, ROW 1, 1930.

(Notes on seed and lint characters made November 4, 1926)

#410 (KC 16) Two plants, the stems low, wide-spreading or decumbent, hence very different in habit from the adjacent #409. Stems and petioles hirsute, but not densely so. Leaves soon glabrate above, persistently pubescent beneath, somewhat lighter colored than those of #409, with a rather bright reddish brown pulvinus, rather deeply 5-lobed, the upper lobes short-acuminate, the very short basal lobes more or less ascending, the basal sinus very shallow and open, the nectaries small, usually present on the three principal veins. Involucre small but about equalling or slightly exceeding the very small corolla, the bracts nearly separate, the teeth fewer than in #396 but otherwise similar, the external nectaries rather small but conspicuous. Calyx deeply dentate with long-acuminate teeth, oil glands rather numerous and conspicuous. Petals pale yellow, spotless. Pollen cream. Stigmas considerably exserted. Bolls 3- or 4-locked, nearly globular, very short-pointed with a blunt tip, smooth but with rather conspicuous oil glands. Seeds covered with greenish fuzz. Lint short and sparse, white.

Note made in Mexico, Sept., 1924. Petals yellow, spotless.  
Coacrit, Sonora.

Seeds (original collection in Mexico) completely fuzzy, the fuzz greenish, that at base longer and whitish.

35h  
~~24~~

GOSSYPIUM FROM SONORA AND SINALOA (KEARNEY & COLLINS)  
AS GROWN AT TORREY PINES, BORDER 2, ROW 1, 1930.

(Notes on seed and lint characters made November 4, 1926)

#411 (KC 17) One plant, straggling, stems long, decumbent. Stems and petioles densely hirsute. Leaves soon glabrate above, persistently very pubescent beneath, deep green with a very dark brown pulvinus, scarcely longer than wide, deeply 5-lobed, the upper lobes acuminate, the basal lobes very short, more or less ascending, basal sinus open, narrow or wide, nectary as in #396. Involucre Upland-like, slightly exceeding the corolla, bracts nearly separate, their teeth long and rather broad, conspicuously ciliate, the external nectaries fairly conspicuous. Calyx deeply dentate, the teeth occasionally setose-prolonged, oil glands rather numerous and conspicuous. Petals light yellow, spotless. Pollen very pale yellow. Stigmas very long. Bolls 3- or 4-locked, nearly globular or short ovoid, abruptly pointed, the point very short or fairly long, smooth but with numerous and conspicuous oil glands. Seeds conspicuously tufted at base with long whitish fuzz. Lint short and sparse, white.

Seeds (original collection in Mexico) with the basal fuzz very long, white, covering from 1/4 to nearly 1/2 of the seed surface.

GOSSYPIUM FROM SONORA AND SINALOA (KEARNEY & COLLINS)  
AS GROWN AT TORREY PINES, BORDER 2, ROW 1, 1930.

(Notes on seed and lint characters made November 4, 1926)

#412 (KC 15) Two plants, with numerous, tall, erect stems. Stems and petioles strongly hirsute. Leaves persistently pubescent along veins beneath, soon glabrate above, dark green with a rather bright, intensely colored, reddish-brown pulvinus, rather shallowly 3- or 4-lobed, the upper lobes broad, mostly rather short-acuminate, basal sinus rather narrowly triangular, nectary as in #396. Involucre nearly equalling to somewhat exceeding the corolla which is large for this series, the bracts nearly to quite separate, their teeth rather few and rather broad, external nectaries very small or wanting. Calyx long-toothed, oil glands fewer and less conspicuous than in most of this series. Petals nearly white, spotless. Pollen very pale yellow. Stigmas short. Bolls 3- or 4-lock, nearly globular but quadrangular (unique in this series) nearly pointless, very smooth but with oil glands conspicuous. Seeds conspicuously tufted at base with rather long, greenish-white fuzz. Lint sparse, longer than in most of this series, white.

GOSSYPIUM FROM SONORA AND SINALOA (KEARNEY & COLLINS)  
AS GROWN AT TORREY PINES, BORDER 2, ROW 1, 1930.

(Notes on seed and lint characters made November 4, 1926)

#413 (KC 14). Two plants with long, suberect stems, internodes long. Stems and petioles very hirsute. Leaves very pubescent beneath when young, persistently pubescent on the veins beneath, deep but not dark green with a conspicuous dark reddish-brown pulvinus, deeply and rather narrowly 5-lobed, the upper lobes long-acuminate, the exceptionally long basal ones at right angles to the petiole, basal sinus open, usually narrow but sometimes wide-triangular, nectary on midvein only, usually very small and round but occasionally somewhat elongated. Involucre exceeding the very small corolla, bracts somewhat connate, exceptionally long, their teeth conspicuously ciliate with rather long hairs, rather numerous, very long and broad, external nectaries very conspicuous. Calyx long-toothed with conspicuous oil glands. Petals pale yellow, spotless. Pollen cream. Stigmas long. Rolls very different from rest of the series, mostly 3-lock, occasionally 4-lock, rather long and slender, tapering to a long sharp point, the 4-lock ones more nearly typical, rather deeply pitted for this series, the oil glands rather conspicuous. Seeds distinctly stipitate, naked except for a minute basal tuft of bright brown fuzz. Lint sparse, white.

Seeds (original collection in Mexico) naked except for a small, sharply defined basal tuft of rufous hairs.

35K  
-27-

GOSYPIUM FROM SONORA AND SINALOA (KEARNEY & COLLINS)  
AS GROWN AT TORREY PINES, BORDER 2, ROW 1, 1930

(Notes on seed and lint characters made November 4, 1926)

#414 (KC 3) One plant. Stems rather long, decumbent or ascending. Stems and petioles very hirsute. Leaves persistently pubescent on whole surface beneath, about the same color as in #413, pulvinus also similar, 5-lobed but not deeply so, the upper lobes much shorter and less acuminate than in #413, the very short basal ones spreading or ascending, basal sinus usually long and narrow and sometimes closed, nectary as in #396. Involucre Upland-like, exceeding the small corolla, the bracts separate or nearly so, short and broad, their teeth numerous, long, rather slender, conspicuously ciliate, external nectaries small but rather conspicuous. Calyx long-toothed, oil glands rather numerous and conspicuous. Petals rather bright yellow (grade 4) spotless. Pollen very pale yellow. Stigmas long. Bolls 3- or 4-locked, short ovoid or nearly globular, abruptly very short-pointed, smooth but with numerous and conspicuous oil glands. Seeds conspicuously tufted at base with long, whitish fuzz. Lint sparse, white.

Seeds (original collection in Mexico) with a very large basal tuft of long, whitish fuzz, extending frequently over 1/2 or more of the seed surface.

GOSSYPIUM FROM SONORA AND SINALOA (KEARNEY & COLLINS)  
AS GROWN AT TORREY PINES, BORDER 2, ROW 1, 1930

(Notes on seed and lint characters made November 4, 1926)

#415 (KC 8). Two plants. Stems many, rather long, ascending. Stems and petioles rather densely long-hirsute. Leaves persistently pubescent beneath especially on the veins, bright green with a conspicuous rather bright red pubescent (about as in Acala Upland) rather deeply 5-lobed, the upper lobes acuminate, the rather long basal lobes nearly at right angles to the petiole, the basal sinus from deep and closed by the overlapping leaf margins to open and broadly triangular, nectary on the midvein only, nearly orbicular to short elliptic, very small. Involucre considerably exceeding the small corolla, the bracts more or less connate, large, much coarser-toothed than in #396, their teeth rather numerous, long, broad and conspicuously ciliate, external nectaries exceptionally large and conspicuous for this series. Calyx long-toothed, oil glands rather numerous and conspicuous. Petals nearly white, spotted (grade 7 to 9). Pollen cream. Stigmas slightly to moderately exerted, not long as in most of the series. Bolls mostly 4-lock, nearly spherical to short ovoid, abruptly pointed, the point very short to rather long, smooth but with oil glands numerous and rather conspicuous. Seeds not stipitate, naked except for a very small basal tuft of very short, bright brown fuzz. Lint short, sparse, white.

Note made in Mexico, Sept., 1924. Flowers very large. Petals very separate in the open flower (windmill effect) deeply notched, nearly white, having very long and conspicuous dark red spots. Stigmas exceeding the stamens. Bracts somewhat connate. Bolls exceptionally long and pointed. Los Mochis, Sinaloa.

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#419. <sup>*africanum*</sup> Gossypium obtusifolium, Tunisia (Asiatic group). Torrey Pines.

Three plants. Stems and petioles reddish-brown, rather densely villous. Leaves rather copiously pubescent on both sides with <sup>simple or</sup> short branched hairs and <sup>very</sup> longer, mostly simple ones on the <sup>beneath</sup> veins, yellowish becoming deep green above, very small, about as wide as long, rather shallowly 5-lobed, the lobes broad-ovate, the upper ones acutish and often mucronate, midlobe distinctly narrowed towards base, the lower lobes nearly at right angles, rounded at apex, often sublobate, basal sinus shallow, broadly triangular and very open, nectary very small but fairly conspicuous, rounded-triangular, near base of midvein only. Pedicels very short, before anthesis spreading or declined.

If this is G. obtusifolium, that species is closely related to G. herbaceum.

Riverside (Sept. 25) Plant has upper leaf lobes obtuse or acutish, basal sinus sometimes very narrow and deep, nectary prominent, sometimes nearly circular.

Palm Springs (Sept. 27) One fine plant. Stems and leaves as above described. Pedicels, before anthesis, ascending or horizontally spreading. Bracts slightly to strongly connate, short-pubescent and ciliate, teeth short, broad below, setose-acuminate. Calyx margin crenulate, oil glands few but conspicuous, nectaries at base between bracts large, inverted delta-shaped.

Torrey Pines, Sept. 18, 1931. Involucre and calyx as of the Palm Springs plant described in 1930, the bracts with about 4 very short teeth. Corolla small but much exceeding the very small involucre. Petals bright yellow with wrinkled margins and very large, dark red spots. Stamens thickly <sup>very</sup> orange. Stigmas not exceeding the stamens.

36a

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS.

# 419. Gossypium obtusifolium Tunisia (Asiatic group).

Palm Springs, Sept. 29, 1931. A fine large plant. Corolla small but about twice as long as the very small involucre, the bracts nearly separate, rather crisp, very sparsely pubescent and ciliate, having about 5 very short, setosely tipped teeth. Calyx margin crenulate, oil glands rather numerous, conspicuous. Petals with conspicuously plicate margins (a striking character) bright yellow with dark red spots occupying about 1/4 the area of the petal. Pollen orange. Stigmas barely exserted. Bolls 3-lock, small. Seeds densely covered with short, white fuzz. Lint very short and sparse, white.

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#420 *Gossypium* sp. (barbadense x hirsutum ?), Algeria.

Torrey Pines. Plant in border 2, row 2. Apparently South American in all characters except the spotless petals. Stems and petioles glabrous or nearly so. Leaves sparingly pubescent on the veins beneath and on the pulvinus above with long hairs, dark green above, 5-lobed nearly to the base, the upper lobes oblong-lanceolate, long-acuminate, the lower lobes long, at right angles or nearly so, basal sinus closed near its base, broadly triangular below, nectaries nearly circular, near the bases of the 3 principal veins. Involucre nearly equalling to slightly exceeding the rather small corolla, bracts crisp, extremely connate, very broad, scarcely cordate, with long slender teeth. Calyx margin rather deeply undulate, oil glands very numerous. Petals bright yellow, spotless. Pollen grade 6. Stigmas only slightly exerted. Bolls 3-lock, very large and plump, ovoid, conspicuously sharp-pointed, surface with very numerous, rather deep pits.

Torrey Pines, Sept. 17, 1931. Seeds coherent (kidney)  
fuzz-less except for a small basal tuft.  
Lint white.

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#420(?) Gossypium barbadense x hirsutum (?) Algeria (?)

Torrey Pines. Plant in row 6 of border 2, identification somewhat doubtful but more evidently a hybrid than the plant in row 2. Stems numerous, tall, erect or ascending, mahogany brown, glabrous. Petioles sparsely stellate-pubescent. Leaves sparsely pubescent beneath with rather long, weak, simple or branched hairs, dark green above with a dull-brown pulvinus, pale beneath, very deeply 5-lobed, the lobes oblong-lanceolate, attenuate-acuminate, midlobe occasionally coarsely toothed, the lower lobes at right angles or slightly reflexed, basal sinus shallow, open or partly closed, nectary small but rather prominent, circular or nearly so, near base of midvein and sometimes of one of the principal lateral veins. Involucre exceeding the corolla, bracts of texture intermediate between barbadense and hirsutum, nearly glabrous, nearly separate, with numerous long and rather broad teeth. Calyx deeply dentate with acute or acuminate teeth and numerous oil glands. Petals yellow (grade 4 ?) very faintly spotted. Pollen grade 6. Stigmas long. Bolls 4-lock, short, very plump, short-ovoid to nearly spherical, pointless, sometimes with conspicuous apical furrows, Pima-like in color and surface. Seeds ~~as~~ noted in 1928, <sup>as</sup> nearly naked and not cohering.

Torrey Pines, Sept. 21, 1931. Bolls sometimes very short-pointed. Seeds separate, covered almost completely with long greenish fuzz. Evidently a South American x Mexican hybrid. - A smaller plant just north of the stake evidently belongs to this number, having precisely similar bolls.

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#421 *Gossypium* sp. Tree cotton, Florida <sup>Cape Sables</sup> (Harris) (Mexican group ?)  
Riverside, Sept. 26. <sup>(plant dead, 1931)</sup> Plant glabrous except the very young leaves.  
Petioles becoming nearly black, slightly roughened by the prominent black oil glands, long, equalling or exceeding the leaf-blades. Leaves deep green and somewhat shiny above with a nearly black pulvinus, shallowly 3-lobed with occasionally one or two coarse teeth indicating an additional one or two lobes, lobes triangular-ovate, acuminate, basal sinus rather deep and narrow but open, nectary rounded-triangular or narrowly elliptical, near base of midvein only.

Palm Springs (Sept. 27) Two plants corresponding closely with the above description. Leaf lobes abruptly but rather long-acuminate and very sharply so.

Palm Springs, Sept. 29, 1931. Both plants are alike and are apparently identical with #694 except that the petioles are less prominently warty. Seeds and lint as in #694. — The practical identity of these forms, one from the mainland of Florida and the other from the Keys, indicates stability of the type.

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS.

#422 Gossypium cernuum, India (Asiatic group). Torrey Pines,  
 Sept. 1930. A young plant on the terrace, very similar to G. arboreum.  
 Stems tall, slender, erect or spreading, dark brown, becoming nearly  
 black, densely puberulent with stellate hairs. Petioles long, dark  
 brown, densely puberulent and with scattered long, mostly simple hairs.  
 Leaves shortly stellate-pubescent on both surfaces with long, simple  
 hairs on the larger veins beneath,\* dark green above with a very small  
 dull reddish-brown pulvinus, deeply and narrowly 5-lobed, the lobes  
 oblong-lanceolate, acuminate but not sharply so, midlobe distinctly  
 narrowed towards base, basal sinus very shallow and open or almost none,  
 nectary small, but conspicuous, round-triangular, towards base of midvein  
 and often smaller ones on one or both principal lateral veins.

Palm Springs Sept. 27, 1930. Stems and leaves as at Torrey Pines,  
 pedicels, involucre and flowers as in #669 (G. cernuum) at Palm Springs.  
 Petals light yellow.

Torrey Pines. Sept. 24, 1931. The plant resembles G. nanking  
 rather than G. arboreum. Bolls very large for an Asiatic cotton, exceeding  
 the involucre, 3-4-lock, ovoid, tapering from near the base to a rather  
 blunt point, with remarkably long and deep apical furrows, the surface pale  
 green, rough, deeply pitted, <sup>bolls</sup> very handsome when open. Seeds small, densely  
 covered with short, greenish-white fuzz. Lint very short, white, coarse  
 and wooly.

Palm Springs Sept. 29, 1931. Stigmas long for an Asiatic cotton,  
 flower otherwise as described last year for #669 at Palm Springs. Bolls  
 3-lock, large for an Asiatic cotton.

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\* Pubescence persisting chiefly on the larger veins of the upper  
 surface, more extensively on the lower surface.

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#422 Gossypium cernuum, India (Asiatic group) Riverside  
(Sept. 26) <sup>(plant dead, 1931)</sup>  
Two good-sized plants, apparently related to G. Wanking.  
Stems tall, slender, dark-brown, puberulent as are the petioles, the  
latter with a few longer hairs, equalling or longer than the leaf blades.  
Leaves stellate-puberulent, especially beneath, with scattered long hairs  
on the veins, gray-green with a small brownish pulvinus, small, deeply  
5-lobed, the upper lobes oblong-lanceolate, acute, midlobe scarcely  
contracted towards base, the lower lobes at right angles, basal sinus  
shallow, open-triangular, nectary small but prominent, rounded-triangular,  
near base of midvein and often on one or both of the principal lateral  
veins. Pedicels very long, declined or pendent. Involucre somewhat  
shorter than the small corolla, bracts obscurely puberulent, rather firm  
and crisp, strongly connate, with very few, very short teeth and lacking  
external nectaries. Calyx with undulate margin, oil glands numerous  
for the type, conspicuous, nectaries at base between the bracts very large,  
inverted delta-shaped. Petals light yellow (grade 3) with very large,  
very deep-red spots. Stamens numerous, borne to the base of the  
staminal column. Pollen orange. Stigmas short but well-exserted.

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#423 Thespesia populnea, Florida. Torrey Pines. Leaves glabrous except for very small, scale-like, peltate (?) hairs on the veins and petioles, dark green and shiny above, thick, broadly ovate, deeply cordate, short-acuminate, nectary extraordinarily long, narrow, inconspicuous, on lower part of the midvein.

(Plants dead, 1931)

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#424 Gossypium sp., Ecuador (South American group). Torrey

Pines. Four plants, the first and fourth flowering. Young stems, *pulvinus and larger veins above and entire* petioles *and under side of leaves white-tomentose with short, stellate hairs.* Leaves short pubescent above, especially along the veins, dark green above with whitish pulvinus and larger veins, very large, deeply 5-7-lobed, the upper lobes ovate or oblong-ovate, long-acuminate, midlobe often coarsely toothed, the 4th and 5th lobes relatively large, at right angles or slightly reflexed, the 6th and 7th lobes (occasional) very short and deflexed, basal sinus deep, closed for most of its length by overlapping leaf margins, nectary large and conspicuous, rounded-triangular, near base of midvein, smaller nectaries on one or both principal lateral veins. *small for a South American cotton,* Involucre *much shorter than the large corolla,* bracts very soft-pubescent externally, separate, very broad, deeply cordate, with numerous rather short, slender or rather broad teeth. Calyx *very shallowly crenate* *from very short and* *very long and acutely dentate* oil glands very numerous. *Stamens many, borne nearly to base of column* Petals bright yellow, spotted (grade 7-8). *short or* Pollen orange yellow (grade 6). Stigmas *long.* Bolls (on plants 1 and 4 only) large, very plump, 4-lock, ovoid, tapering to a sharp point, with Pima-like surface.

Compare with #225 which has spotless petals and very different bolls. Torrey Pines, Sept. 18, 1931. Bolls on the third plant very large, both long and plump, 4-lock, short-pointed or almost pointless, otherwise like those of plants 1 and 4 as described in 1930, some with long apical furrows, glabrous even when very young. Seeds (on first plant) densely covered with long brown fuzzy lint very short, nearly white.

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#430 Gossypium indicum (= G. Nanking ?) Indo-China (Asiatic

group). Torrey Pines. Two plants. Stems long, slender, prostrate

or ascending, dark brown, densely soft-pubescent when young, ~~as are the~~  
*densely pubescent and villous.*

petioles. Leaves rather copiously pubescent <sup>on both surfaces</sup> beneath with simple (?)

*or branched* ^ *more densely so and with hairs* ^ *below*  
*hairs, these much longer and denser on the large veins, more sparsely*

~~pubescent~~-above, deep green above, rather deeply 5-lobed, the upper lobes

oblong-lanceolate or ovate-lanceolate, acutish or obtuse, often mucronulate,

sometimes with a very short, broad, rounded "tooth" in the upper sinus which

are very broad and rounded, the lower lobes very obtuse, at right angles

or somewhat reflexed, basal sinus very shallow and open, broadly triangular,

nectary of midvein circular, near the base or sometimes rather high, nectaries

sometimes present also on the principal lateral veins. Pedicels short,

declined, very strongly so at and after anthesis. Involucre nearly

equalling the very small corolla, bracts rather soft, very pubescent,

strongly connate, without external nectaries, with very few and very short

teeth. Calyx shallowly dentate with few but conspicuous oil glands

and very large nectaries at base between the bracts. Petals light

yellow with very large and very dark mahogany-red spots. Pollen rich

orange. Stigmas long. Bolls 3-4-lock, very small, spherical or very

short-ovoid, sharply apiculate, often with long and deep apical furrows,

surface pale green, somewhat pitted.

Not more than varietally different from (comparison follows)-

G. Nanking. (See # 393)

*Torrey Pines, Sept. 23, 1931 Seeds densely  
covered with short, very pale-green fuzz.  
Lint very short, white.*

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#435. Gossypium obtusifolium (labelled G. fruticosum)

Torrey Pines. French West Africa (Asiatic group) Four plants.

Stems brown, these and the petioles densely villous. Leaves very soft-pubescent, especially beneath, with short stellate hairs <sup>much</sup> and longer simple ones along the veins, deep green <sup>beneath</sup> above with a very small dull-brown <sup>(light yellowish-green when young)</sup> pulvinus, very small, little longer than wide, 5-lobed, lobes very broad-ovate, midlobe rather conspicuously narrowed towards base, <sup>and either</sup> obtuse, acute or very short-acuminate and usually mucronate, the upper lateral lobes acutish, the basal lobes short and rounded, often themselves slightly lobed, basal sinus shallow and open, broadly triangular, nectary rather conspicuous, short-elliptical, near base of midvein only. Pedicels <sup>very</sup> short, spreading horizontally or declined. Involucre shorter than or somewhat exceeding the small corolla, bracts soft, very pubescent, from rather strongly to very strongly connate, lacking external nectaries (or a rudimentary one present ?) their teeth few or rather numerous, rather short and broad. Calyx margin irregularly erose to deeply dentate, oil glands few but conspicuous, nectaries very large, rounded, delta-shaped (inversely) below calyx between bracts but not always present. Petals light yellow with huge, deep red spots. Pollen orange. Stigmas from barely to rather long-exserted.

Torrey Pines Sept. 18, 1931. The first plant has involucral nectaries present but apparently not functional, bract teeth 7 to 9, rather long for an Asiatic cotton; corolla much exceeding the involucre, petals with crinkled margins and spots occupying about 1/3 the area; stamens rather numerous, borne nearly to the base of the column; bolls 3-lobed, very small, ovoid, abruptly very short-pointed, the lobes faces concave, surface light green, very smooth and somewhat shiny.

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#436. Gossypium obtusifolium (labelled G. fruticosum)

French West Africa (Asiatic group). Torrey Pines. Four plants, resembling #435 in the characters of the stems, leaves, pedicels, involucre and flowers. Bolls (on 4th plant only) very young, 3-lobed, 3-lobed vertically between the carpels, very short-ovoid, almost pointless, the surface pale green and smooth but with rather conspicuous oil glands.

Torrey Pines, Sept. 18, 1931. Involucre scarcely  $\frac{2}{3}$  as long as the corolla. Petal spot occupying about  $\frac{1}{4}$  the area of the petal. Flowers and bolls otherwise as described for #435.

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#437 Gossypium punctatum, French West Africa (Mexican group).

Palm Springs (Sept. 27) Two good plants. <sup>(one dead, 1931).</sup> Stems very sparsely villous, petioles nearly glabrous. Leaves sparsely ciliate and with very few long hairs on the veins beneath, otherwise glabrous, deep green with a conspicuous liver-colored pulvinus, about equally wide and long, very shallowly 5-lobed, the upper lobes broad-triangular, subacuminate to abruptly attenuate-acuminate, the lower lobes mere teeth, basal sinus often rather deep and narrow, nectary near base of midvein, more or less elongated, narrowly triangular, sometimes present also on one of the principal lateral veins.

Palm Springs, Sept. 29, 1931. The one surviving plant has leaves like those of #670 (G. jamaicense) at Palm Springs, except that the nectaries are more elongated, and the petioles and large veins beneath are sparsely pubescent. Bolls 3-4-locks, very small. Seeds almost completely covered with white fuzz. Lint extremely short, white.

GOSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#449 Gossypium hirsutum, Morocco, received as G. punctatum x G. peruvianum (Mexican group) Torrey Pines. Two plants, typical hirsutum in all characters. Calyx with long-acuminate teeth.  
(Plants dead, 1931)

#450 Gossypium hirsutum, Morocco, received as punctatum x peruvianum, (Mexican group) Torrey Pines. Two plants, <sup>(one dead, 1931)</sup> exactly like #449, except that the bolls tend to be shorter and less pointed. (Sept. 23, 1931) Seeds covered (not densely) with short green fuzz. Lint very short, white

#452. Gossypium barbadense, Porto Rico (South American group) Torrey Pines, Sept. 22, 1931. Foliage typically South American.

#454 Gossypium hirsutum (?) Mexico (Mexican group) Torrey Pines. Three plants, upland-like. Involucre exceeding the corolla, sometimes considerably. Calyx with one or more teeth sometimes extended into a long seta. Anthers pale yellow, pollen ditto (grade 4). Stigmas fairly long. Bolls 3-5-lobed, more slender and pointed than is usual in Upland cottons, surface smooth but oil glands unusually conspicuous.

To be compared with #396 etc. of the Kearney and Collins series.

Torrey Pines, Sept. 18, 1931 Bolls much larger than in the K. and C. series, pointed or nearly so, surface light green. Seeds covered with whitish fuzz. Lint very short, white

GOSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#458 *Gossypium* sp. Tahiti (South American group) Torrey Pines.

Stems and petioles glabrous. Leaves rather copiously pubescent beneath <sup>simple or branched</sup> and on the pulvinus above with long soft hairs, deep green above with a greenish pulvinus, very large, deeply 5-lobed, all the lobes ovate-lanceolate, attenuate-acuminate, the basal lobes at right angles or slightly reflexed, basal sinus rather shallow, often closed for a greater or less distance from the base by overlapping leaf margins, nectary small but rather conspicuous, nearly circular, near base of midvein only. Involucre huge, much exceeding the corolla, bracts crisp, broad, deeply cordate, external nectaries two, large, teeth numerous, long, rather slender. Calyx deeply dentate with triangular obtuse teeth, and with 3 large triangular nectaries at base between the bracts. Petals nearly white, spotless. Pollen orange-yellow (grade 6) Stigmas little exerted. Bolls (very young) apparently all 3-lock.

Torrey Pines, Sept. 18, 1931. Well-developed bolls 3-4-lock, long, oblong-ovoid, short pointed, often with apical furrows, surface dark green, rather shiny, copiously pitted. The pits somewhat deeper than in Orma Egyptian.

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#461 *Gossypium* sp., Tahiti (South American group). Torrey Pines.  
Stems glabrous or nearly so, petioles sparsely stellate pubescent, rather densely so near summit. Leaves copiously stellate-pubescent beneath and on the pulvinus and principal veins above, dark green and shiny above, pale beneath, firm, very deeply lobed, lobes usually 3 but sometimes with 1 or 2 short basal lobes in addition, lobes triangular-ovate to ovate-lanceolate, acuminate, basal sinus shallow, triangular, much narrowed or closed near its base, nectary rather large and conspicuous, rounded triangular, near base of midvein, much smaller nectaries on one or both principal lateral veins. Involucre about equalling the corolla, bracts crisp, nearly glabrous. Calyx shallow-crenate with numerous oil glands. Petals bright yellow, spotted (grade 8). Pollen orange (grade 7). Stigmas well-exserted. Bolls 3-4-lock, ovoid, very plump, almost pointless, surface shiny and rather deeply pitted (more so than in Pima Egyptian).

(Plant removed in 1931)

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#453 *Gossypium* sp., New Caledonia (South American group)

Torrey Pines. Three plants, two of them flowering. Stems glabrous, petioles very nearly so. Leaves rather copiously pubescent beneath and on the pulvinus above with long, simple or branched hairs, dark green and shiny above with a greenish pulvinus, paler beneath, rather thick and firm, deeply 5-lobed when well-developed, the upper lobes ovate-lanceolate, long-acuminate, the lower lobes (often wanting) short, at right angles or nearly so, basal sinus shallow, closed by overlapping leaf margins for more or less of its length, nectaries conspicuous, deep, circular or round-triangular, on the 3 principal veins but that on the midvein much larger. Involucre exceeding the corolla, bracts crisp, smooth, very broad, separate, with numerous rather long, rather slender teeth. Calyx with slightly to rather deeply crenate margin (teeth occasionally attenuate-acuminate) and numerous oil glands. Petals bright yellow, spotted (grade 6). Staminal column elongated. Pollen orange-yellow (grade 6). Stigmas barely exserted. Bolls (immature) <sup>as</sup> noted in 1928, 3-4-lock, short pointed, surface rather smooth.

Torrey Pines, Sept. 18, 1931. Well-developed bolls much as noted to-day for #453 but shorter, plumper, often nearly pointless and more deeply pitted.

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#467 Gossypium peruvianum, Peru (South American group).

Torrey Pines. Two plants. Leaves sparingly pubescent beneath and on the pulvinus above with rather long hairs, deep green with an inconspicuously-colored pulvinus, large, deeply 5-7-lobed, the upper lobes ovate-oblong, long-acuminate, the 4th and 5th lobes at right angles or nearly so, the 6th and 7th lobes, when present, very short and deflexed, basal sinus usually closed towards base, open below, nectary nearly circular, near base of midvein and sometimes on one of the principal lateral veins.

GOSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#468 Gossypium barbadense Guadeloupe, West Indies (South American group) Torrey Pines. Two plants, one flowering, <sup>(one dead, 1931)</sup> Stems glabrous, petioles <sup>nearly so.</sup> very sparsely pubescent. Leaves <sup>Copiously</sup> pubescent beneath and on the pulvinus <sup>sparingly so on the</sup> and large veins above, with short, stellate hairs, dark green and somewhat shiny above with a dull light-brown pulvinus, firm, very large, very deeply 5-lobed, the upper lobes ovate-lanceolate, long-attenuate-acuminate, midlobe often coarsely toothed, the lower lobes often very long, at right angles or somewhat reflexed, basal sinus deep but closed, often nearly its whole length, by the strongly overlapping leaf margins, nectaries prominent, rather large, circular or round-triangular, near base of midvein, smaller ones on one or both principal lateral veins. Involucre very large, from nearly squalling to slightly exceeding the large corolla, bracts crisp, nearly glabrous, very broad, deeply cordate, separate, with numerous long, rather broad teeth, the terminal one itself sometimes toothed. Calyx deeply crenate, oil glands very numerous. Petals yellow (grade 4) spotless. Pollen orange-yellow (grade 6). Stigmas barely exerted.

Torrey Pines, Sept. 21, 1931. Stigmas sometimes well-exserted, separate towards apex. Bolls shorter than the involucre, 3-lobed (rarely 4-lobed) ovoid, plump, tapering to a rather short sharp point, often with long and deep apical furrows, dark green, somewhat shiny, copiously and deeply pitted.

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

# 493 Gossypium <sup>brasiliense?</sup> sp., Brazil (South American group). Torrey Pines.

Four plants. Stems and petioles glabrous or nearly so. Leaves sparsely pubescent beneath and on the pulvinus above with long soft hairs, deep green and shiny above with a dull light-brown pulvinus, much paler beneath, somewhat buckled, very deeply 5-lobed, the upper lobes very long, ovate-oblong, attenuate-acuminate, lower lobes at right angles or slightly reflexed, basal sinus closed towards base, nectaries small, round-triangular, near the bases of the 3 principal veins. Involucre slightly exceeding the rather large corolla, bracts crisp, separate, with rather few long and rather broad teeth. Calyx long, deeply crenate, oil glands numerous. Petals bright yellow, spotless. Pollen orange-yellow (grade 6). Stigmas short to well-exserted.

Sept. 17, 1931. Bolls 3-lobed, remarkably long and slender, tapering to a very long and very sharp point, surface rather deeply pitted. Seeds (plant 4) strongly coherent (kidney) most of their surface fuzzy-less but with a small basal tuft and often a little along the raphe and elsewhere, fuzzy green. lint abundant, short, white.

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# 495 Gossypium hirsutum? (Mysore American) - Mexican group. Torrey Pines. Sept. 22, 1931. Typical hirsutum in vegetative characters, flowers and bolls except that the petals are very pale yellow. (Compare # 505)

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#496 Gossypium sp., Tanganyika (South American group).

Torrey Pines. Three plants, two flowering. Stems dark mahogany brown, glabrous or very nearly so. <sup>as are the petioles.</sup> Leaves copiously pubescent on ~~the principal veins~~ <sup>rather</sup> beneath and on the pulvinus above with long, soft, <sup>or branched</sup> ~~mostly simple~~ <sup>larger veins above</sup> hairs, sparsely so on the ~~rest of the lower surface~~, dark green and shiny above with a pale-brown pulvinus, very deeply 5-lobed, the upper lobes oblong-lanceolate, attenuate-acuminate, the lower lobes relatively long, at right angles or somewhat reflexed, basal sinus shallow, open-triangular except at the very base, nectaries small but conspicuous, round-triangular, near the bases of all 3 principal veins. Involucre large, considerably exceeding the rather small corolla, bracts separate, very broad, with many long teeth of medium width. Calyx shallowly to deeply crenate, oil glands numerous. Petals rather light yellow, spotless. Pollen orange-yellow (grade 5). Stigmas barely to moderately exserted. Bolls (very young) mostly 3-lock, ovoid, pointed, copiously pitted with very small pits.

Riverside (Sept. 26) One plant, similar to those at Torrey Pines but leaves only sparsely pubescent beneath, the upper lobes ovate-oblong, basal sinus partly closed by the overlapping leaf-margins.

Riverside, Sept. 5, 1931. Seeds strongly coherent (Kidney) devoid of fuzz.

Torrey Pines, Sept. 18, 1931. Well-developed bolls 3-4 lock, short, plump, ovoid, short-pointed, rather deeply pitted, often with apical furrows. Seeds fuzz-less except at base and along the raphe. Sinit very short, white.

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#501 Gossypium sp., Brazil, received as "Moco Tree cotton" but apparently of the Mexican group. Torrey Pines. Young stems and petioles rather strongly pubescent with stellate hairs. <sup>long simple or</sup> Leaves sparsely pubescent beneath and on the pulvinus and larger veins above, <sup>with similar hairs</sup> bright green above with a dark reddish-brown pulvinus, shallowly 5-lobed, the upper lobes very broad, triangular-ovate, the lower lobes usually hardly more than teeth, basal sinus shallow, open but narrowed towards base, nectary conspicuous, circular or short-elliptical, near base of midvein only. (Compare #750)

Resembles the plant labelled #2310 in row 3.

#505 Gossypium hirsutum x peruvianum ? India, received as "Mysore-American," Torrey Pines. Two plants, one flowering. Stems and petioles villous. Leaves Upland-like. Involucre nearly equalling to slightly exceeding the small corolla, bracts Upland-like with conspicuous external nectaries. Calyx deeply dentate with acute to setose-acuminate teeth. Petals pale yellow, spotless. Anthers pale yellow. Pollen cream. Stigmas barely to distinctly exerted. Bolls 3-lock, exceptionally long, slender and tapering for an Upland cotton, surface Upland-like. <sup>Sept. 18, 1931. Bolls 3-4-lock. Seeds covered with long white fuzz. Lint short, white, upland-like.</sup> The pale yellow color of the petals and the shape and lock number of the bolls alone suggest any but hirsutum parentage. (Compare #495)

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GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS.

# 513 *Gossypium* sp., India (Asiatic group). Torrey Pines.  
Sept. 22, 1931. Stems and leaves very similar to *G. arboreum*  
(as represented by #618 and 620) except that the leaves are dark green  
instead of purple. Bracts strongly connate, with few, short teeth.  
Bolls 3-lobed, ovoid, abruptly short-pointed, with long apical furrows,  
surface light green, rough, deeply pitted.

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#521 Gossypium herbaceum, Malta (Asiatic group). Torrey Pines.

Stems dark brown, villous. ~~as are the petioles.~~ <sup>villous and pubescent.</sup> Leaves ~~decidely~~ <sup>rather densely</sup>  
~~pubescent beneath, less so above,~~ <sup>on both surfaces</sup> with <sup>very</sup> short <sup>mostly</sup> stellate hairs and longer <sup>much</sup>  
<sup>mostly simple</sup> ones on the veins, light green above with an inconspicuous brownish <sup>beneath</sup>  
 pulvinus, rather shallowly 5-lobed, the lobes very broad, rounded,  
 obtuse and often mucronate, basal sinus very open-triangular, nectary  
 small and inconspicuous, near base of the midvein, only. Involucre  
 about equalling the very small corolla, bracts extremely connate, very  
 pubescent, fairly crisp in texture. Calyx margin merely erose, oil  
 glands rather few but conspicuous. Petals light yellow with very large,  
 deep-red spots. Pollen light-orange. Stigmas short. Boll 4-lock,  
 nearly spherical, almost pointless, with conspicuous apical furrows,  
 its surface very smooth.

Torrey Pines, Sept. 17, 1931. Pedicels deflexed  
 after anthesis. Bolls sometimes 5-lock, the apical  
 furrows very long.

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#527 Gossypium tomentosum, Hawaii. Torrey Pines. Plant on terrace, too young for satisfactory description but apparently correctly named. (dead, 1931)

Palm Springs (Sept. 27) Plant small and rather sickly (has angular leaf spot). Leaves so far all 3-lobed, petioles about as long as the blades, the leaves puberulent with minute stellate hairs, very densely so on the lower surface and petiole, bluish in color at first, then grayish-green, leaf nectaries apparently none.

A plant in border 1, row 1 at Torrey Pines, and a plant in row 8 south of the laboratory at Riverside are labelled #527 G. tomentosum <sup>(dead 1931)</sup>  
~~(both dead, 1931)~~

but apparently incorrectly. The latter resembles one of the south Florida tree cottons as does a plant at Bard labelled # 527.

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS.

#528 Gossypium brasiliense ? Sumatra, received as "kidney cotton" (South American group). Torrey Pine, Sept. 1930. Stems and petioles glabrous. Leaves sparsely pubescent beneath and on the pulvinus above with long soft hairs, dark green and shiny above, paler beneath, rather flaccid and conspicuously buckled, very large, deeply 5-lobed, upper lobes ovate-lanceolate, exceptionally long-attenuate-acuminate, the lower lobes long, long-acuminate, at right angles, basal sinus rather deep, closed for more or less of its length by overlapping leaf margins, nectary on the midvein rather small but conspicuous, usually deep red, round-triangular, a smaller nectary often on one or both principal lateral veins.

Torrey Pine, Sept. 3, 1931. Petals very pale yellow, spotless (Sept. 18, 1931). Involucre very large, bracts somewhat connate, with numerous very long and broad teeth. Bolls 3-lock, long and slender, tapering from near base to a long and very sharp point, surface dark green, shiny, rough, deeply pitted. Seeds strongly coherent (kidney) with most of the surface fuzzless, the small quantity present being very short. Lint short, white.

#529 Gossypium obtusifolium, Algeria (Asiatic group).  
Torrey Pine, Sept. 1930. Resembles in all its characters #435.

#531 Gossypium purpurascens, Trinidad. (See under #571).  
Riverside, Sept. 5, 1931. Bolls mostly 4-lock, much longer than broad, pointed, rather deeply pitted.

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

# 537 Gossypium brasiliense apospermum, Trinidad. (South American group). Torrey Pines. Stems and petioles glabrous or very nearly so. Leaves sparsely pubescent beneath with stellate hairs, dark green above with a dull brownish-green pulvinus, rather pale beneath, very large, very deeply 5-7-lobed, the upper lobes very long, oblong-lanceolate, attenuate-acuminate, the midlobe coarsely few-toothed, the 4th and 5th lobes relatively long, at right angles or somewhat reflexed, 6th and 7th lobes (occasional) very short and almost parallel to the petiole, basal sinus deep but closed by overlapping leaf margins, nectaries sharply defined, round-triangular, on each of the 3 principal veins and sometimes on a 4th vein. Involucral bracts broad, with many long slender teeth. Calyx shallowly crenate, oil glands numerous. Petals bright yellow, rather weakly spotted (grade 6). Pollen yellow. Stigmas moderately long.

Torrey Pines, Sept. 16, 1931. Bolls 3-4 inch long, rather slender, tapering to a sharp point, copiously but not deeply pitted.

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GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS.

# 541 Gossypium patens, Mexico (Mexican group) Torrey Pines,  
Sept. 24, 1931. Closely resembles G. contextum (#542) in its  
vegetative characters, flower and bolls.

# 542 Gossypium contextum, Mexico (Mexican group). Torrey Pines,  
Sept. 24, 1931. Stem much branched, branches and petioles villous.  
Leaves bright green with a conspicuous red-brown pulvinus, rather sparsely  
villous on the larger veins of both surfaces and elsewhere on the lower  
surface with long, often simple hairs, 5-lobed, the lobes broadly ovate  
and rather abruptly acuminate, the upper lobes overlapping at base and  
sometimes with a coarse tooth, the basal lobes spreading nearly at right  
angles to the midvein, basal sinus rather deep but usually open, nectary,  
towards base of the midvein (and often of one or both principal lateral  
veins) small, nearly circular. Involucre (of a small late flower)  
exceeding the corolla, the bracts slightly connate, broadly ovate, deeply  
cordate, with 5 to 7 long, broad teeth. Calyx rather deeply and acutely  
dentate with one or more of the teeth often subulate-acuminate, the oil  
glands rather numerous, conspicuous. Petals nearly white, not spotted.  
Pollen nearly colorless. Stigmas well-exserted. Bolls 4-lock, nearly  
spherical, pointless or nearly so, the surface upland-like. Seeds fuzzless  
except for a very small basal tuft of greenish fuzz. Lint white, very  
short and rather sparse.

(Nos. 541 and 542 are evidently related to the K. & C. series,  
Nos. 396, etc.)

GOSSYPIMUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

~~#541 Gossypium patens, Sonora (Mexican group). Torrey Pines.  
(dead 1931)  
Plant on terrace resembles G. hirsutum in stem and leaf characters.  
^~~

~~#542 Gossypium contextum. Sinaloa (Mexican group).  
(dead 1931)  
Torrey Pines. Plant on terrace resembles G. hirsutum in stem and  
^  
leaf characters.~~

#550 Gossypium calycotum, Ecuador (South American group).  
(dead 1931)  
Torrey Pines. Plant on terrace has leaves whitish beneath with  
^  
dense, short-stellate pubescence.

~~#559. Gossypium hirsutum, Siam (Mexican group)  
Torrey Pines, Sept. 1931. Typical hirsutum in vegetative  
and flower characters. (dead 1931)~~

~~<sup>564</sup>  
#592 Gossypium Sturtii (see under #632)~~

GOSSYPIMUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#616 Gossypium brevilanatum, Madagascar. Palm Springs  
(Sept. 27). An excellent plant <sup>(dead, 1931)</sup> Young stems and petioles  
quadrangular but angles scarcely winged and not warty. Petioles about  
as long as the leaf blades. Leaves densely, minutely puberulent on  
the pulvinus and large veins above, very nearly glabrous beneath  
(unusual distribution of pubescence) deep green and very shiny above  
with yellowish (not at all reddish) pulvinus and large veins, lighter  
green beneath, obscurely punctate, deeply 5-lobed, the lobes long-  
attenuate-acuminate, the upper ones ovate to oblong-ovate, the basal  
ones ascending, usually strongly so, never reflexed, basal sinus very  
open, from somewhat narrowly to very broadly triangular, nectary near  
base of midvein only, short-elliptical to considerably elongated.

Evidently related to G. Kirki (#674) but differing in many  
important characters.

GOSYPIUM AND RELATIVES AT CALIFORNIA STATIONS? SEPTEMBER, 1930.

#617 Erioxylum aridum, Mexico. Torrey Pines. Older stems woody with somewhat roughened grayish-brown bark. Young stems puberulent with stellate hairs, the petioles very densely so. Leaves sparsely stellate-pubescent and with a few longer hairs on the veins beneath, light green when young, deep green when old with an inconspicuous brownish-green pubescence, the blade much longer than the petiole, ovate, entire, bluntly acuminate, shallowly cordate with a very open sinus, nectary none.

The plants at Riverside and Palm Springs were not examined but appear to be identical with the above.

Palm Springs, Apr. 18, 1931. One of the plants has 2 flowers, purplish-red in color with darker spots, Gossypium-like except for the very small involucre.

Palm Springs, Sept. 1, 1931. A few of the leaves have one lobe which is rather long and narrow or is short and broad.

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#618 Gossypium arboreum, India (Asiatic group). Torrey Pines.

Two plants. Stems tall, erect, slender, becoming nearly black, pubescent, especially when young. Leaves pubescent, especially beneath, hairs simple, bronze purple when young, dull dark green with dull purplish veins and pulvinus when older, small, not much longer than the nearly black villous petioles, very deeply and narrowly 5-lobed, the lobes oblong-lanceolate, mucronate, midlobe often with one or two very short lobes at base, the lower lobes at right angles and often very short lobate near base, basal sinus shallow and open, nectary small, towards base of midvein only or occasionally also on one of the principal lateral veins. Pedicels long, spreading horizontally at anthesis. Involucre and flower as in #620 except that the calyx teeth are longer and the stigmas are fairly long.

Torrey Pines (Sept. 16, 1931) Involucre nearly equalling the small corolla bracts strongly connate, with 3 or 4 short teeth, their nectaries apparently not functional. Calyx dentate with acute teeth, its oil glands few but conspicuous. Petals as in #620. Stamens rather few. Pollen orange. Stigmas fairly long. Bolls as in #620.

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#619 Gossypium intermedium, India (Asiatic group). Riverside.  
(Sept. 26) Two good plants. Stems brown, conspicuously villous as are also the relatively long petioles, the latter reddish at summit. Leaves puberulent on both surfaces, rather long-ciliate, villous with long hairs on the veins beneath, deep grayish-green above with an uncolored pulvinus, deeply 5-lobed, the upper lobes oblong-lanceolate, sharply acuminate, midlobe widest near the middle, distinctly narrowed towards base, the lower lobes acute or short-acuminate, at right angles or somewhat reflexed, often themselves distinctly lobed, the basal sinus shallow-triangular or rather deep and narrow, nectary small but rather prominent, rounded-triangular, near base of midvein and often on one or both principal lateral veins. Pedicels rather short, erect, horizontal or strongly declined. Involucre about equalling the small corolla, bracts soft, pubescent, slightly to strongly connate, the broad teeth exceptionally numerous and long for an Asiatic cotton, external nectaries wanting. Calyx relatively long, deeply dentate with acute to setose-acuminate teeth, nectaries at base between bracts 3, not large for an Asiatic cotton. Petals pale yellow with large dark-red spots. Stamens borne to the base of the staminal column, rather numerous. Pollen light orange. Stigmas short but well-exserted. Bolls (not mature) very small, 3-lock, rounded-triangular, merely apiculate, surface pale, shallow-pitted.

Palm Springs (Sept. 27). The plant at Palm Springs corresponds closely with the above in the characters of the stems, leaves, involucre and calyx (no open flowers) except that it was noted that the stems are rather densely villous, the leaf nectary very small, and the calyx with few but conspicuous

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GOSSYPIMUM AND RELATIVES AT CALIFORNIA STATIONS.

# 619 Gossypium intermedium, India (Asiatic group) Palm Springs,  
Sept. 29, 1931. Corolla small but much exceeding the involucre. Petal  
margins crinkled but not nearly so conspicuously so as in #419  
(G. obtusifolium). Bolls 3-lock, very small. Seeds completely covered  
with short white fuzz. Lint sparse, extremely short, coarse, white.

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#620 Gossypium arboreum, India (Asiatic group). Torrey Pines.

Two plants in border 1 and one plant on terrace, stems and leaves similar in all respects to #618.\* Pedicels long, spreading horizontally at anthesis. Involucre slightly exceeding the very small corolla, bracts dark purple-brown outside, stellate-pubescent, strongly connate, with few short broad teeth and no external nectaries. Calyx very short-dentate with few but conspicuous oil glands and very large inverted delta-shaped, round-angled nectaries at base between the bracts. Petals deep crimson with very large mahogany-red spots. Stamens very few. Pollen bright orange-yellow. Stigmas short. (Compare #618).

Riverside (Sept. 26) One plant (dead 1931) Stems and petioles puberulent and villous. Leaves puberulent on both surfaces with long hairs on the veins, especially beneath. Leaf lobes acute as well as macronate. Pedicels erect (even after anthesis) to more often horizontal or slightly declined. Involucral bracts merely puberulent, their teeth very few, very short and broad. Calyx dentate or merely shallowly cleft into broad truncate divisions. Stamens rather numerous. Pollen rich orange. Stigmas short but well-exserted.

Torrey Pines, Sept. 21, 1931. Pedicels deflexed after anthesis. Bolls 3-lobed, small but finally exceeding the involucre, ovoid, sharp-pointed, the faces sometimes concave (due to incomplete fertilization?) sometimes with long apical furrows, surface light green becoming dark purple where exposed to the light, rather deeply pitted. Palms Springs, Sept. 29, 1931. Seeds completely covered with fuzz that is green at first, then brownish. Lint very short, coarse, white.

\* Leaves pubescent, rather copiously so on the margins and lower surface, with simple, branched and stellate hairs.

67a

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS.

# 630 *Gossypium* sp., India (Mexican group) Bard, Oct. 2, 1951.  
Received as *G. neglectum verum* but evidently an American cotton, related to *G. hirsutum*. Foliage Upland-like. Involucre about equalling the small corolla, the bracts nearly separate, narrow, of soft texture, having 8 long, Upland-like teeth. Calyx short-dentate with short, triangular, acute teeth, oil glands numerous for a *hirsutum* relative. Petals nearly white with long narrow spots (grade 9) much as in the King variety. Stamens numerous, borne nearly to the base of the column. Pollen cream-colored. Stigmas somewhat exceeding the upper most stamens.

GOSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#632 Gossypium Sturtii. Torrey Pines. Four plants. Shrubby, many-stemmed, the stems soon woody, with light-colored, gray-brown bark, young twigs dark reddish-brown at first, finally pale green. Plant glabrous throughout. Petioles pinkish, two-thirds or more of the length of the blade. Leaves very glaucous with a very small pinkish pulvinus, always entire, small, ovate, conspicuously cuspidate, cordate with a very short and very narrow sinus, with only 3 conspicuous veins, nectary on midvein only, very long in proportion to the leaf-length, bright red, very near the base, oil glands numerous, rather conspicuous on the very young leaves. Involucre very small, from scarcely  $1/4$  to  $1/3$  the length of the corolla, bracts separate, broadly ovate to oblong-ovate, cordate, entire or very nearly so, short-attenuate-acuminate, with 3 conspicuous red nectaries on the enlarged summit of the pedicel. Calyx short-dentate with very acute, almost setose teeth and numerous oil glands. Petals rich mauve-purple with very large, deep crimson, deeply feathered spots which are strongly asymmetrical ("wind mill" effect), the portion of the petal exposed in bud conspicuously dotted with black oil glands which are wanting elsewhere. Staminal column long with stamens to its base, the filaments and the very small anthers pink-purple. Pollen cream. Stigmas long, sometimes nearly as long as the staminal column. Bolls 5-lock, scarcely more than  $1/2$  inch long, oblong-ovoid, apiculate, the surface not pitted but oil glands conspicuous. Seeds irregularly obovoid, sharply angled, covered with pea green silky fuzz especially along the angles and at top.

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#636 Gossypium Darwinii (?) Galapagos Islands. Torrey Pines.

Plant on terrace outside. Petioles long but appreciably shorter than the blades, warty. <sup>densely</sup> Leaves pubescent along veins <sup>the larger and on the pulvinus</sup> above and on whole surface <sup>(veinlets)</sup> beneath, with appressed stellate hairs, pubescence <sup>partly</sup> persistent, especially beneath, leaves firm, buckled, very dark green and not brown-dotted above with pulvinus only slightly colored, deeply 5-lobed, the lobes broad, rather abruptly long-acuminate, ~~often~~ <sup>several-</sup> coarsely toothed, basal sinus triangular, partly closed by overlapping leaf margins, nectary near base of midvein only, elongated, inconspicuous, apparently sometimes wanting. Another plant on the terrace under screen is similar. It has dark-brown, almost black stems and petioles, the petioles fully as long as the blades, sparsely pubescent, the leaf veins pinkish above.

Riverside (Sept. 26)

Two plants in south block.

(both dead, 1931)  
Petaloes

glabrate, warty. Leaves yellowish-green (not dark) conspicuously brown dotted above with large and small oil glands, with reddish veins and conspicuous red-brown pulvinus, noticeably buckled only when young, the upper lobes broadly ovate or ovate-oblong, rather abruptly acuminate, nectary elongated, very inconspicuous and apparently wanting on some leaves.

Riverside (Sept. 26).

One plant in north block, very different

(dead 1931)

from the two at south. Petioles long, leaves very sparsely short-pubescent with stellate hairs on the veins of both surfaces and over the whole surface beneath, deeply 5-lobed. Resembles the plant at Torrey Pines but the leaves are rather soft and flaccid, more or less buckled and lacking nectaries.

Torrey Pines, Sept. 24, 1931 (plant on terrace).  
Leaf with mid-lobe contracted at base, its nectaries usually absent.

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#636 Gossypium Darwinii, Galapagos Islands. Palm Springs  
(Sept. 27). Three plants <sup>(one dead, 1931)</sup> <sub>1</sub> The first (west) in row <sup>2</sup>X has the leaves rather conspicuously brown-dotted above, as at Riverside, while the second plant in the same row apparently lacks this character, but is too young. The third plant (in row <sup>4 dead 1931</sup> <sub>3</sub>) which seems quite different from the first, has the leaves brown-dotted only on the most exposed portions of the surface, very short-stellate-pubescent beneath but not densely so, soon glabrate above, nectary small, not elongated, inconspicuous.

Bard, Apr. 16, 1931. Much like the plant of # 709 here but leaves 3-lobed and much less pubescent.

Palm Springs, Sept. 29, 1931. <sup>Two plants.</sup> Similar to # 637 here but the leaves are not conspicuously brown-dotted and the pubescence is lighter-colored.

GOSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#637 Gossypium Darwinii (?) Galapagos Islands. Torrey Pines.

(dead 1931)  
On terrace under screen <sup>^</sup> Closely resembles the adjacent plant of #636  
are less pubescent and  
but the leaves are dotted, (conspicuously when young, less so when old)  
<sup>^</sup>  
with numerous brown oil glands, very small and sharply defined on lower  
surface, both small and large on upper surface, the larger ones being of  
irregular outline and often pink margined, these only faintly evident  
on lower surface and looking there like groups of water-impregnated  
cells. (Are they due to diffusion of the oil into neighboring cells?)

In #637 the leaf nectary is much more conspicuous and more sharply defined  
than in #636, also shorter, from nearly circular to somewhat elongated.

Riverside (Sept. 26). Two plants, <sup>(both dead, 1931)</sup>  
<sup>^</sup> Stems, petioles and leaf  
pulvinus nearly black, the petioles conspicuously warty. Leaves stellate-  
pubescent on the pulvinus and rather obscurely so on the veins of both  
surfaces. Leaves brown-dotted above, also on the lower surface where  
exposed, the veins purplish, the upper lobes broadly ovate, occasionally  
coarsely dentate, the nectary on the mid-vein conspicuous, very long,  
sharply pointed (towards apex of leaf).

Palm Springs (Sept. 27). Three plants, similar to those at  
Torrey Pines but the leaf nectaries often much elongated, petioles  
conspicuously warty, leaf pulvinus very large, nearly black.

Palm Springs, Sept. 29, 1931. The 3 plants are  
alike, very erect and strict. Leaves  
glabrescent copiously brown-dotted even  
when mature, deeply cupped.

GOSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#638, 639, 640, 641. Gossypium hirsutum, Irak (Mexican group).

Torrey Pines. All alike, typical Upland, stems very villous, calyx teeth long-acuminate.

Torrey Pines, Sept. 21, 1931. Bolls 4-5-lobed, large, ovoid, pointed, the surface upland-like. Seeds (cf. #640) partly covered with long white fuzzy. lint white.

#643 Gossypium sp. Nicaragua (Mexican group ?) Riverside

(Sept. 26) Plant glabrous or very nearly so. Leaves deep green above with a small, reddish-brown pulvinus, shallowly 5-lobed, the upper lobes triangular-ovate, short-acuminate, the lower lobes very short, triangular, basal sinus rather deep, narrow or wide, nectary nearly circular to decidedly elongated, rather conspicuous, on midvein only or also on one of the principal lateral veins.

Palm Springs (Sept. 27). Three good plants, corresponding to the above description but leaf pulvinus good-sized and conspicuous, the upper leaf-lobes rather long-acuminate, the lower lobes better developed than at Riverside, basal sinus sometimes partly closed by overlapping leaf margins, leaf-nectary often very long.

Palm Springs, Sept. 29, 1931. Somewhat resembles the plant of #670 (G. jamaicense) here but the leaves are much more deeply lobed. The plant in row 3 has darker green and more deeply lobed leaves than the other two and the lobes are deeply cupped and tend to overlap.

\* In #638 the leaves are sparsely pubescent on the large veins above and copiously so on the margins, lower surface and petiole with rather long, mostly branched or stellate hairs.

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#644 *Gossypium* sp. "Wild tree cotton," Terra Ceia, Florida (Mexican group). Torrey Pines. Stems densely villous, leaves very pubescent. Suggests relationship to *G. hirsutum* and the Kearney and Collins series from western Mexico.

Riverside (Sept. 26) <sup>(dead 1931)</sup> Plant similar to that at Torrey Pines.

Palm Springs (Sept. 27) <sup>(one dead 1931)</sup> Three plants, similar to those at Torrey Pines.

" " Sept. 29, 1931. The 2 plants remaining seem identical. Leaves shallowly 3-lobed. Seeds covered with long bright-brown fuzz. Lint pale brown, very sparse and uneven.

#645 *Gossypium brasiliense* (?) "Kidney cotton," Fiji (South American group). Torrey Pines. <sup>rather copiously</sup> Leaves pubescent beneath with long, <sup>sparingly so on the large veins above and on the margins,</sup> soft, simple or branched hairs, bright green becoming dark green above, very large, deeply 5-lobed, the upper lobes ovate-lanceolate, attenuate-acuminate, often coarsely dentate, lower lobes long, at right angles or slightly reflexed, basal sinus deep and narrow, frequently closed by overlapping leaf margins, nectary near base of midvein conspicuous, roundish. Involucre much exceeding the large corolla, bracts crisp, sparingly pubescent, broad, deeply cordate, with very long, slender, twisted teeth. Calyx deeply dentate with acutish teeth and very numerous oil glands. Petals bright yellow, <sup>rather</sup> faintly spotted (grade 4). <sup>tsb</sup> Pollen bright yellow (grade 5). Stigmas long.

Torrey Pines, Sept. 15, 1931. Boll very long, reaching 2 1/2 inches, attenuate from near base to a sharp point 3-4-lobed, surface copiously and deeply pitted. Seeds strongly coherent (kidney) fuzz-less except for a very small basal tuft. Lint white.

GOSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#646 *Gossypium* (American x Asiatic F<sub>1</sub>), South Carolina. Torrey Pines.

Three plants. Stems and petioles dark reddish-brown, densely short-pubescent (as in *G. arborescens*) <sup>with stellate hairs</sup>. Leaves rather densely short-pubescent, <sup>on the large veins above,</sup> especially <sup>on the whole surface</sup> beneath, <sup>with stellate hairs,</sup> dark green (color intermediate) with a dark red-brown pulvinus, rather deeply 3-5-lobed, the upper lobes ovate or oblong-ovate, scarcely acuminate, mucronate, the 4th and 5th lobes, when present, at right angles or nearly so, basal sinus usually open but much narrowed towards base, nectary small but conspicuous, on midvein only. Pedicels spreading or somewhat declined. Involucre very long, equalling or exceeding the corolla, bracts slightly to strongly connate, soft and very pubescent, with comparatively short broad teeth. Calyx deeply and sharply dentate with acute or acuminate teeth, oil glands rather few but more numerous than in most Upland cottons, conspicuous. Petals pale yellow, conspicuously spotted (grade 7-9); Pollen bright yellow (grade 5). Stigmas slightly to moderately exerted.

Obviously has characters of both parental types.

Torrey Pines, Sept. 21, 1931. The bolls, which are always shed a few days after anthesis, are 3-lobed, broad at base, tapering to a very sharp point, surface somewhat pitted. (The boll characters seem to justify J. B. Norton's opinion that the American parent of this hybrid was itself Mexican x South American (Upland x Sea Island?).)

75

GOSSEPIUM AND RELATIVES AT CALIFORNIA STATIONS.

#651 Shantzia garckeana (# 647 x 649 F<sub>1</sub>) Torrey Pines, Sept. 1930.

Older stems woody with grayish-brown bark. Young stems, petioles and leaves scurfy with very short stellate hairs which are more persistent on the lower leaf surface. Leaves dark green above, thick, leathery, scarcely longer than the petioles, nearly orbicular, very shallowly 3-lobed, lobes much wider than long and sub-acute, basal sinus much deeper than in *Gossypium*, closed by overlapping leaf margins, nectary near base of midvein, conspicuous, elongated.

Riverside, Sept. 26, 1930. Young stems green, leaves very large, quadrangular-orbicular, basal sinus open but rather narrow, nectary near base of midvein extraordinarily long. Pedicels extra-axillary on main stem, jointed near the middle. Involucral bracts 10 (?) very narrow, fugacious. Calyx very shallow, not dentate but 5-apiculate. Petals thick, deep red inside, not spotted. (old flower?) Stamens very numerous, borne to the base of the column. Pollen yellow, stigmas well-exserted.

Riverside, Sept. 5, 1931. Corolla deeply campanulate, petals spreading only at tip, strongly plicate or crinkled, light yellow with well-developed petal spots (grade 6). Pollen orange-yellow (grade 6). Stigmas only a little surpassing the stamens.

75a

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS.

#659 Gossypium hirsutum (received as G. Nanking). Siam (Mexican group). Torrey Pines, Sept. 1930. Leaves and involucres typically Upland. Calyx very deeply dentate with one or more of the teeth greatly elongated.

Torrey Pines, Sept. 21, 1931. Flower typical Upland except for the elongated calyx teeth. Boll 4-lock, nearly spherical, short-pointed, the surface Upland-like.

Riverside, Sept. 26, 1930. <sup>(dead 1931)</sup>  
λ Plant similar but calyx teeth merely acute.

Palm Springs, Sept. 27, 1930. Two plants, very pubescent, the stems and leaves Upland-like, leaves rather deeply and narrowly lobed, the lobes attenuate-acuminate.

Palm Springs, Sept. 29, 1931. The two plants are identical and are evidently hirsutum.

GOSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#660 *Gossypium* sp. Tanguis cotton, Peru (South American group).

Torrey Pines. Petioles nearly glabrous. Leaves pubescent beneath and on pulvinus above with long soft hairs, dark green and shiny above with a dull brownish pulvinus, thick and firm, huge, deeply 5-lobed, the upper lobes ovate-oblong, long-acuminate, lower lobes at right angles or slightly reflexed, one of these itself short-lobed, basal sinus deep, almost or completely closed by overlapping leaf margins, nectary near base of midvein, rather deep, somewhat elongated.

Riverside (Sept. 26) Three plants. Leaves when mature from very sparsely to somewhat copiously pubescent beneath, very dark green, very shiny above, conspicuously buckled and coarsely crinkled-margined, all 5 lobes ovate to oblong-ovate, abruptly long-acuminate, the lower lobes not lobate but deeply crinkled, basal sinus very deep, nectary more or less elongated, sharp-pointed (towards apex of leaf). Otherwise like the plant at Torrey Pines.

Palm Springs (Sept. 27) <sup>Three</sup> ~~Two~~ plants, similar to those at Riverside but nectaries very small, rounded-triangular.

#661 *Gossypium peruvianum*, Peru (South American group). Torrey Pines, Sept. 21, 1931. Similar in vegetative characters to #662. Bolls 3 lobs, very plump, very short-pointed with a blunt tip, surface dark green, somewhat shiny, rough, deeply pitted.

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#562 Gossypium peruvianum, Peru (South American group).

Torrey Pines. Two plants. Petioles glabrate, somewhat warty.  
 Leaves <sup>when young</sup> densely white-pubescent, almost tomentose, beneath, becoming  
 dark green <sup>and</sup> somewhat shiny <sup>above</sup> with a dull brown pulvinus above, very large,  
 rather deeply 5-lobed, the upper lobes broadly oblong-ovate, acuminate,  
 the lower lobes at right angles, basal sinus deep, closed by overlapping  
 leaf margins, nectary near base of midvein only, sharply defined, short-  
 elliptical or triangular. Involucre large but shorter than the very  
 large corolla, bracts very pubescent and ciliate, separate, broad and  
 very deeply cordate, with numerous teeth of medium length and breadth,  
 without external nectaries. Calyx slightly <sup>to conspicuously dentate,</sup> orenate, oil glands numerous.  
 Petals deep yellow, spotted (grade 8). <sup>Staminal column long.</sup> Pollen orange-yellow (grade 6).  
 Stigmas moderately exserted, 3 or 4, <sup>separate at apex.</sup>

Palm Springs (Sept. 27) Three plants, one having the upper  
 leaf-lobes occasionally coarsely toothed. The plant in row <sup>4</sup>/<sub>3</sub> has the  
 leaves sparsely pubescent when very young, soon glabrous or very nearly so.

Torrey Pines, Sept. 21, 1931. Bolls similar  
 to those of #661, occasionally 4-lock.  
Palm Springs, Sept. 29, 1931. Seeds fuzzy - less  
 except for a very small basal tuft. Lint  
 short, rather woolly, white.

\* Older leaves sparsely pubescent on the margins and the large veins  
 above, copiously so beneath, the hairs all stellate.

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#663 Gossypium peruvianum, Peru (South American group).

Torrey Pines. Two plants. Leaves like those of #662 but much less pubescent beneath and the basal sinus often open, narrowly triangular, the nectary usually more elongated.

Riverside (Sept. 26) Similar to #660 as grown at Riverside, but leaves very nearly glabrous, very thick and firm for a Gossypium and very dark and very shiny above for a Gossypium, nectary rather deep, short or elongated. Involucral bracts crisp, glabrous, separate or somewhat connate, with rather few, relatively short, very slender teeth near apex. Calyx with entire margin and numerous oil glands. Petals yellow, conspicuously spotted. Pollen grade 6.

#664 Gossypium peruvianum, Peru (South American group).

Torrey Pines. Leaves even less pubescent than in #663, basal sinus and nectary of midvein as in #662, a second nectary frequently present on one of the principal lateral veins.

Riverside (Sept. 26) <sup>(dead 1931)</sup> Leaves as in #663 as grown at Riverside.

Torrey Pines, Sept. 16, 1931. Bolls 3-4-lock, rather slender, pointed, copiously pitted.

GOSSYPIMUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#665 *Gossypium* sp., Siam (Mexican group ?) Torrey Pines.

Resembles *G. hirsutum* but very nearly glabrous, pulvinus very dark.

#669 *Gossypium cernuum* India (Asiatic group) Palm Springs

(Sept. 27) Stems and leaves as in #422 (*G. cernuum*) at Torrey Pines.

Pedicels short, sharply declined, flowers pendent. Involucre much shorter than the corolla which is rather large for an Asiatic cotton, bracts strongly connate, teeth very few, very short, external nectaries none. Calyx margin entire or nearly so, oil glands very numerous for an Asiatic cotton and conspicuous, basal nectaries very large. Petals light yellow ~~or~~ fading pink, with huge very dark-red spots. Staminal column long, stamens rather numerous, filaments purplish. Pollen orange. Stigmas short but well-exserted.

*Palm Springs, Sept. 29, 1931. Bolls rather long and slender for an Asiatic cotton, 4-lobed, the faces concave, apical furrows long but shallow, surface pale green, deeply pitted.*

#670 *Gossypium jamaicense*, Trinidad (Mexican group ?) Palm Springs.

One plant. Glabrous throughout. Leaves deep green above with conspicuous nearly black pulvinus, very shallowly 5-lobed, the lobes triangular, sharply acuminate, the basal ones scarcely more than coarse teeth, basal sinus shallow, closed at base, nectary small, very short-elliptical, near base of midvein.

*Palm Springs, Sept. 29, 1931. one species of*  
Apparently nearly related to the South Florida tree cottons (#421 and #694) but the latter have leaves that are scarcely  $\frac{1}{2}$  as large as those of #670 and are more deeply lobed. Also the petioles are warty in the Florida plants, smooth in #670.

GOSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

(see also #531)

#671 <sup>^</sup> Gossypium purpurascens, Trinidad. (South American group ?)

Torrey Pines. Stem and petioles dark purple, nearly black, shining, glabrous or nearly so except when very young. Leaves short-ciliate <sup>with both simple and stellate hairs,</sup> and sparsely short-pubescent on the larger veins of both surfaces, dark green above with purple veins and a nearly black pulvinus, dotted with black oil glands which are rather conspicuous beneath, large, rather deeply 5-lobed, the upper lobes oblong-ovate, short-acuminate, the lower lobes at right angles or nearly so, basal sinus almost none, nectary near base of midvein only, large and deep, elliptical.

Riverside (Sept. 26) Two plants (one under #531). <sup>this alone surviving, 1931)</sup> Leaves rather densely pubescent on both surfaces with rather long, mostly branched hairs, the upper lobes ovate, very sharply short acuminate, frequently coarsely dentate, sometimes 7-lobed with very short basal lobes, basal sinus shallow, broadly triangular. Leaf nectaries triangular-elliptical, often on all 3 principal veins. Otherwise as at Torrey Pines.

Palm Springs (Sept. 27) Three plants (one under #531). <sup>(one dead, 1931)</sup> basal sinus pronounced, closed or nearly so at base, oil glands not conspicuous on either leaf-surface, nectary of midvein much elongated, nectaries sometimes on all 3 principal veins, otherwise as at Torrey Pines.

Torrey Pines, Sept. 24, 1931. Plant on terrace. Petioles very long, exceeding the leaf blades, persistently pubescent especially towards apex, even on full-grown leaves. Oil glands of leaf-blades not conspicuous.

Palm Springs, Sept. 29, 1931. The 2 plants (#531 and #671) seem to be exactly alike. Both have a narrow and rather deep basal sinus of the leaf, which sometimes is partly closed.

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

\*  
#672 Gossypium Schottii, Trinidad (originally Mexico?). Torrey Pines.  
(dead, 1931)

Stems and petioles dark purplish-brown, petioles nearly glabrous. Leaves  
when mature with simple and branched hairs,  
sparsely stellate-pubescent on veins and margins, dark green above with  
purplish-brown veins and pulvillus, very deeply and narrowly 5-lobed, the  
upper lobes oblong-lanceolate, long-acuminate, midlobe often irregularly  
short-lobed or very coarsely toothed towards base\*, lower lobes more or  
less ascending and often with a short lobe, basal sinus very shallow,  
open-triangular, nectary near base of midvein only, small but rather deep  
and prominent, more or less triangular (sometimes narrowly so) or  
short-elliptical.

Palm Springs (Sept. 27) <sup>Three</sup> ~~Two~~ plants. Leaves very sparsely  
pubescent, basal sinus often partly closed, otherwise as at Torrey Pines.

Palm Springs, Sept. 29, 1931. Leaf nectary  
elongated, narrow, often a mere slit.

\* It was noted at Shafter, Cal., Sept. 8, 1931 that the  
"Digitized by the Hunt Institute for Botanical Documentation" has the lobes coarsely toothed on many of the larger stem leaves.

GOSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#673 *Gossypium* <sup>*brasiliense?*</sup> sp. Kidney cotton, Fiji (South American group).

Riverside, Sept. 26. Two large plants. Leaves (not densely) pubescent beneath and on large veins and pulvinus above with mostly branched hairs, very dark green and shiny above with a dull brown or reddish pulvinus, thick and firm, very large, deeply 3-lobed, the upper lobes ovate-oblong, the lower lobes triangular-ovate, all attenuate-acuminate, the lower lobes at right angles or somewhat reflexed, basal sinus deep, closed about 1/2 its length by overlapping leaf-margins, nectary conspicuous, rounded-triangular, near base of midvein and often on one or both principal lateral veins. Involucre very large, exceeding the corolla, bracts somewhat connate, very broad, deeply cordate, with <sup>very</sup> many rather short and slender teeth. Calyx very long with undulate margin and very many oil glands and with 3 large nectaries at base between the bracts. Petals nearly white, spotted. Pollen golden yellow. Stigmas well-exserted but short. Bolls 3-4-look, long, very short-pointed, with pronounced apical furrows, dark green, deeply pitted. Seeds naked except a very small tuft of greenish fuzz at base, strongly adnate (Kidney). Lint white.

Palm Springs (Sept. 27) Leaves soon glabrous or nearly so.

Torrey Pines, Sept. 24, 1931. Calyx shallowly dentate with obtuse or acutish teeth. Stamens very numerous. Pollen grade 6.

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#674 Gossypium Kirkii, eastern Africa. Torrey Pines. Two plants (very young). Entirely glabrous except for a few stellate hairs on the pulvinus above. Young stems and the petioles quadrangular, narrowly winged, the wing margins conspicuously warty. Leaf blades shorter, often much shorter, than the petioles, very shiny and rich green with reddish-brown veins and pulvinus above, paler beneath and copiously dotted with small black oil glands, conspicuously buckled, wider than long, deeply 5-lobed and sometimes with 2 additional very short, deflexed basal lobes, the upper lobes ovate-oblong, strongly acuminate, the basal lobes relatively long, at right angles or somewhat reflexed, basal sinus from broadly triangular to deep and narrow but always open, nectaries small but deep and conspicuous, circular or short-elliptical, usually well above the middle (never near the base) of all five principal veins.

Palm Springs (Sept. 27) Two plants. Leaves much smaller than at Torrey Pines, nectaries on only the 3 largest veins and occasionally a little below the middle.

*Palm Springs, Sept. 29, 1931 Both of the old plants died and another was set out this year.*

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#675 Kokia Rockii. Riverside. <sup>(dead, 1931)</sup> ^ This plant differs from #677 at Torrey Pines in having reddish veins and pulvinus of the leaf, with the basal sinus open-triangular or partly closed.

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#676 Kokia drynarioides, Hawaii. Torrey Pines. Entirely glabrous. Leaves bright green above with a conspicuous reddish-brown pulvinus and summit of the petiole, very firm, little longer than wide, rather shallowly 7-lobed, the lobes triangular-ovate, obtuse, the 4th and 5th lobes at right angles to the midvein, the 6th and 7th more or less deflexed, basal sinus very deep but closed for much of its length by the strongly overlapping leaf margins, giving the leaf a peltate appearance, nectaries none, oil glands numerous but very small and inconspicuous.

*Torrey Pines, Sept. 23, 1931 Pulvinus of leaf brown rather than red.*

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#677 Kokia Rockii, Hawaii. Torrey Pines. Differs from #676 in having densely tufted white hairs at the bases of the veins of the lower leaf surface, leaves darker green above, pulvinus and veins green (entirely uncolored) the basal lobes much shorter and rounder, basal sinus completely closed.

85

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS.

#682 Gossypium barbadense. Sea Island cotton ? (labelled "Florida wild.") (South American group) Torrey Pines, Sept., 1930.  
2 plants. Leaf nectaries large and conspicuous, sometimes on all 3 principal veins.

Torrey Pines, Sept. 15, 1931. Flower and boll typical South American. Boll 3-4-lock, long and slender, tapering to a long, sharp point, surface dark green, shiny, rather deeply pitted. Seeds with a large basal tuft of greenish fuzz, otherwise fuzz-less. Lint long and fine, white or nearly so.

# 683 Gossypium barbadense, Pima variety, Tunisia (South American group). Torrey Pines, Sept. 1930 <sup>and July 1931</sup>  
Typical Egyptian, involucre and flower as in Pima but calyx margin crenulate (usually) to dentate, stigmas from scarcely to well-exserted. ~~(insertions July 15, 1931)~~

Torrey Pines, Sept. 15, 1931. Boll very different from Pima, often 4-lock, short and very plump, pointless, deeply pitted, surface shiny, apical furrows well-developed. Seeds fuzz-less except for a small, sharply segregated basal tuft. Lint Egyptian-like.

#685 Gossypium barbadense, Pima variety, Tunisia. Torrey Pines, Sept. 1930. Typical Egyptian, calyx margin undulate or shallowly crenate (usually) or long dentate.

Torrey Pines,  
Sept. 16, 1931. Bolls as in #683 but usually more pointed and often without apical furrows. Seeds very plump, otherwise as in #683. Lint Egyptian-like.

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS.

#686 Gossypium barbadense, Pima variety, Tunisia. Torrey Pines,  
Sept. 1930. Typical Egyptian but bract teeth rather wide for Pima  
and calyx crenulate (usually) or dentate! (July 15, 1931).

Torrey Pines, Sept. 16, 1931. Bolls as in #685. Lint much  
too short for Pima. Seeds fuzz-less except for a small basal tuft.  
Lint Egyptian-like, decidedly buff in color.

Nos. 683, 685 and 686, while evidently of Egyptian type, are  
very different from typical Pima. Unless strikingly modified by the  
climate of Torrey Pines, it would seem that the cotton grown in Tunisia  
under the name of Pima has departed widely from the type. These  
plants have bolls more like those of Sakel than of Pima.

86

GOSSTIUM AND RELATIVES AT CALIFORNIA STATIONS.

#694 *Gossypium* sp. Wild tree cotton, Florida Keys (Mexican group ?). Torrey Pines, Sept. 1930. Young stems and petioles glabrous, roughened by the numerous prominent black oil glands. Leaves glabrous, deep green and somewhat shiny above with a large, liver-colored pulvinus, rather shallowly 3-4 or 5-lobed, the upper lobes triangular-ovate, acuminate, the lower lobes scarcely more than teeth, at right angles to the midvein, basal sinus rather deep, narrow towards base, broadly triangular below, nectary near base of midvein only, rounded-triangular, small but sharply defined.

Appearance suggests affinity to *G. hirsutum* in spite of the absence of pubescence. (Compare *G. jamaicense*).

Riverside, Sept. 26, 1930, <sup>(dead 1931)</sup> Leaves rather copiously pubescent beneath and on the pulvinus above with mostly stellate hairs, the midlobe oblong-ovate, acuminate, the basal lobes short but well-developed, at right angles to the midvein, basal sinus sometimes closed towards base. Otherwise resembles the plant at Torrey Pines.

Palm Springs, Sept. 27, 1930. Two plants (one dead, 1931). Leaves mostly 5-lobed but the basal lobes scarcely more than coarse teeth, the upper lobes abruptly but long- and very sharp-acuminate.

Torrey Pines, Sept. 3, 1931. Bracts separate or nearly so with 7 to 9 rather long and slender teeth (subulate tipped). Calyx barely dentate or merely undulate with sparse or fairly numerous and conspicuous oil glands. Corolla barely surpassing the involucre. Petals nearly white with large but not intensely colored spots (grade 5 to 8). Stamens numerous, borne nearly to the base of the staminal column. Pollen bright yellow (grade 5) Stigmas shorter than or somewhat exceeding the uppermost stamens. Bolls very small, mostly 3-loc, ovoid, nearly pointless, surface bright green, conspicuously pitted.

86a

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS.

#694 *Gossypium* sp. (Continued)

Palm Springs, Sept. 29, 1931. Petioles rough with prominent warts, a striking character. Nectary of leaf midvein elliptical, sharp-pointed at upper end. Seeds completely covered with long, bright-brown fuzz. Lint pale brown, very short and sparse. (see notes on #421).



87a

GOSSEYIUM AND RELATIVES AT CALIFORNIA STATIONS.

#696 Gossypium darwinii(?) Galapagos Islands. Palm Springs,  
Sept. 29, 1931. The plant in row 2 is very different from that in row 5,  
having very small leaves. The (much larger) plant in row 5 is much  
more spreading than most of those from the Galapagos Islands. It has:  
young stems and petioles reddish brown, petioles warty. Leaves deep  
green with dark margins and a dark brown pulvinus, of rather soft texture,  
pubescent with very short stellate hairs on the larger veins above and  
more generally but rather sparsely so beneath, hanging almost vertically,  
deeply 5-lobed with all of the lobes ascending, oblong-ovate, long-acuminate,  
Boll (an old one) very small, 3-lock, acuminate. Seeds covered with  
reddish-brown fuzz. Lint pale brown, very short and sparse.

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GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS.

# 697 Gossypium Darwinii (?) Galapagos Islands. Riverside,  
(dead 1931)  
Sept. 26, 1930. ^ Midlobe of leaves with several coarse teeth. Plant  
too poor for further description.

Palm Springs, Sept. 27, 1930 (dead, 1931). Stems and petioles  
dark brown, petioles somewhat warty. Leaves puberulent on large veins  
and pulvinus above, over whole surface beneath, deep green with a dull  
dark-brown pulvinus, deeply 5-lobed, the upper lobes oblong-lanceolate,  
attenuate-acuminate, the basal lobes short, at right angles to the midvein,  
basal sinus very shallow, partly closed, leaf nectary none.

88a

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS.

#698 / *Gossypium* sp. Galápagos Islands. Torrey Pines, Sept. 1930.

Plant in border 1 too small for description. Plant on terrace looks like G. hirsutum, the stems and petioles villous with long spreading hairs, the involucre of young buds very Upland-like.

Palm Springs, Sept. 27, 1930 (dead, 1931). Plant probably G. Darwinii. Leaves pubescent beneath, petiole not warty, nectary on midvein conspicuous and very long.

Bard, Apr. 16, 1931. Leaves small, entire or slightly lobed, these and the young branches very pubescent. Very different in appearance from any other plants of the Galápagos series I have seen.

Torrey Pines, Sept. 24, 1931 (plant on terrace outside). Involucral bracts with many long, rather slender teeth. Calyx deeply crenate, its oil glands rather sparse. Plant in border <sup>1</sup> looks like G. hirsutum, the stems very hairy.

GOSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#699 Gossypium Darwinii (?) Galapagos Islands. Riverside.

Sept. 26. Petioles warty and somewhat stellate-pubescent towards summit. Leaves stellate puberulent on large veins and pulvinus above, on the whole surface beneath, deep green above with a reddish-brown pulvinus, reddish veins and black margins, rather deeply 5-lobed, the upper lobes ovate-oblong, acuminate, the lower lobes at right angles to the midvein to rather strongly reflexed, basal sinus closed towards base, nectary near base of midvein only, very small and inconspicuous, sometimes apparently wanting.

Palm Springs (Sept. 27) <sup>(one dead, 1931)</sup> Two plants correspond to the description of the plant at Riverside, stems and petioles dark brown. A third plant (in row <sup>(dead, 1931)</sup> 2) has a rather conspicuous, more or less elongated leaf-nectary.

Palm Springs, Sept. 29, 1931. The one surviving plant has the stem and large branches very erect and strict, the bark of the young branches and petioles nearly black. Leaves with very short pubescence, the basal lobes at right angles to the midvein or ascending (apparently never reflexed) the basal sinus rather narrow, but open, the leaves drooping so that the blade is nearly vertical.

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS.

C.B. 700 Gossypium Klotzschianum Anderss. Torrey Pines, July 15 and Sept. 19, 1931. As grown here, a tree 10 feet high and 3 inches in diameter at base, with ascending branches, older bark light brown, young twigs and petioles pubescent with very short, stellate hairs. Leaves attaining a length of nearly 8 inches and a width of nearly 5 1/2 inches, mostly entire but those on young shoots sometimes slightly 3-lobed at apex, ovate, acuminate at apex, subcordate at base (truncate or subcuneate on young plant), rather soft in texture and frequently somewhat buckled, bright green with a small, reddish-brown pulvinus, pubescent on both surfaces with very short, mostly branched or stellate hairs, nectary near base of midvein only, conspicuous, somewhat elongated. Fruiting branches short, bearing 1 or 2 flowers. Pedicels very short, usually about 1/2 inch long, erect or ascending. Involucre shorter than the corolla, the bracts separate, of soft texture, rather densely pubescent with very short, mostly stellate hairs, broadly ovate, deeply cordate, with numerous rather long and broad, erect or incurved teeth, their nectaries well-developed. Calyx very short, its margin entire or undulate, oil glands rather numerous, green, nectaries none. Petals very asymmetrical, rotating strongly from left to right, strongly plicate, light yellow (grade 4 ?) with a short greenish claw, the spots very characteristic, the red pigment being fairly intense but in separate, parallel lines. Stamens numerous but occupying only the upper half of the staminal column, filaments rather short, anthers buff, pollen nearly colorless. Stigmas 4 or 5, pale green with darker green oil-glands, united nearly to apex and erect or separate down to the summit of the staminal column and more or less spreading (even incurved), rather broad and flat, strongly twisted. Bolls 4- or 5-lobed, very small, less than

900

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS

G.B. 700 Gossypium klotzschianum Anderss. (Cont'd)

1 inch long (much shorter than the involucre) tapering from near the base to a rather blunt apex without a "shoulder," surface light green, smooth. Seeds resembling those of G. Davidsonii but not at all coherent, falling from the boll as fast as it opens, covered with closely appressed, crinkled hairs which are <sup>sparser and less crinkled</sup> ~~longer~~ than in G. Davidsonii and of a golden-greenish color, much as in G. stocksii.

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

Stat #700 Gossypium Klotschianum ~~Pa.~~ Galapagos Islands. Torrey Pines, \*

one plant. Stems soon glabrous. Petioles rather short, somewhat warty. Leaves very pubescent on both surfaces with short stellate hairs, <sup>and on the margins</sup> light green with a dull reddish-brown pulvinus, rather soft in texture, buckled, very large, the lower ones entire or nearly so, the upper ones very short 3-lobed at apex, little longer than wide, acuminate at apex, truncate or subcuneate at base, nectary near base of midvein only, elongated, conspicuous.

(apparently none of the hairs simple)

Palm Springs (Sept. 27) One plant. Leaves very densely short-pubescent on both surfaces, light green, almost yellowish, with a very small dull brown pulvinus, much longer than wide, long-acuminate, deeply cordate with a rather narrow, open sinus, larger ones 2- or 3-lobed above the middle, the edges of the leaf below the lobes remarkably straight (leaf approximately rectangular) the one or two lateral lobes when present very short, triangular, scarcely more than coarse teeth, nectary near base of midvein only, elongated.

The plant at Palm Springs evidently belongs to the same species as the one at Torrey Pines. They are very different from any others of the Galapagos collection.

\* S. C. Harland in letter dated May 15, 1931 writes:  
"No. 700 is close to G. Klotschianum. It has 13 chromosomes  
I am not sure about its being a Gossypium at all, since we have not been able to graft it on to cotton."

## GOSSYPIMUM AND RELATIVES AT CALIFORNIA STATIONS.

#702 Gossypium Darwinii (?) Galapagos Islands. Riverside,  
 Sept. 26, 1930. <sup>(dead 1931)</sup>  
 ^ Petioles somewhat warty. Leaves when young densely  
 stellate-pubescent beneath and on pulvinus above, sparsely and inconspicuously  
 so above and on the petiole, brown-dotted above but not conspicuously so,  
 pulvinus large and conspicuous, reddish-brown, lobation, etc., much as in  
 #636 and 637, nectary small but conspicuous, rounded triangular, near base  
 of midvein and sometimes much smaller ones on the principal lateral veins.

Palm Springs, Sept. 27, 1930. One plant, similar to the one at  
 Riverside but the leaves not brown-dotted.

Palm Springs, Apr. 18, 1931. In flower, the flower typically  
 South American!

Palm Springs, Sept. 29, 1931. Stem and large branches rather strict  
 and erect, the young bark dark mahogany colored. Leaves obscurely brown-  
 dotted above, their pubescence very short (stellate), rather light green  
 with a very large, reddish-brown pulvinus, hanging almost vertically, rather  
 small for one of the Galapagos series, the nectary of the midvein wanting  
 or rudimentary in all leaves examined, the basal sinus narrow but usually  
 open, leaves deeply lobed, the lobes oblong-ovate, long-acuminate, cupped  
 and overlapping at base.

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GOSSYPIMUM AND RELATIVES AT CALIFORNIA STATIONS.

#703 Gossypium Darwinii (?) Galapagos Islands. Torrey Pines,  
Sept. 1930. One plant (description amended Sept. 23, 1931). Stems and  
petioles dark brown. Petioles as long as the leaf blades or nearly so,  
persistently pubescent, somewhat warty. Leaves persistently pubescent  
with short, appressed, mostly branched hairs which are confined largely to  
the veins above but are distributed over the whole surface below which is  
subtomentose, leaves copiously and conspicuously speckled above with large  
and small dark-brown dots, pulvinus dull brown, veins at first pinkish,  
leaves large, soft, drooping, folded below the upper sinuses, deeply 5-lobed,  
the upper lobes very broad, oblong-ovate and rather abruptly long-acuminate,  
sometimes coarsely dentate, basal sinus closed towards base, broadly  
triangular below, nectary towards base of midvein only, small, somewhat  
longer than wide.

Resembles #708 at Torrey Pines.

Palm Springs, Sept. 27, 1930. Pulvinus dull reddish-brown, upper  
leaf surface not brown-dotted, pubescence minute but rather dense, nectary  
a long narrow slit. Otherwise corresponds with description of the plant  
at Torrey Pines.

Torrey Pines, Sept. 3, 1931. Involucre with separate bracts and  
11 slender teeth, the oil glands of the bracts conspicuous. Calyx entire,  
with numerous oil glands. Petals yellow (grade 5) with large, dark red  
spots (grade 8-9). Staminal column long, with stamens borne nearly to  
its base. Pollen orange-yellow (grade 6). Stigmas short. A typical  
flower of the South American group! Boll (possibly undersized) 3-lock,  
less than 1 inch long, sharp-pointed. Seeds covered with long, light brown  
fuzz. Lint well-developed but scanty, about 1 inch long, fine and silky, buff.

92a

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS.

#703 Gossypium Darwinii (?) (Continued)

Palm Springs, Sept. 29, 1931. Leaves less deeply lobed and the lobes broader than in most of the Galapagos series. (Compare #709)

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#704 Gossypium Darwinii (?) Galapagos Islands. Torrey Pines.

One plant on terrace. Petioles nearly as long as the blades, dull reddish-brown, persistently pubescent. Leaves when young densely pubescent along the veins above and over the whole surface beneath, which is almost tomentose, hairs appressed, mostly stellate, leaves dark green, not brown-dotted, with a dull reddish-brown pulvinus, rather soft, rather shallowly 5-lobed, the <sup>(for a South American cotton)</sup> upper lobes very broad and rather abruptly long-acuminate, basal sinus broadly triangular, nectary near base of midvein only, conspicuous, elongated.

Plant in border 1 too young for satisfactory description. Leaves similar in pubescence and nectary to #708 at Torrey Pines but not brown-dotted above, even the lobes shorter and broader and more abruptly acuminate than in #708.

Riverside (Sept. 26) <sup>(dead 1931)</sup> Corresponds in all respects with description of the plant on terrace at Torrey Pines, the basal leaf-lobes at right angles to the midvein or nearly so.

Palm Springs (Sept. 27) <sup>(dead 1931)</sup> Plant too small for description but apparently similar to #703 at Palm Springs.

Torrey Pines, Sept. 24, 1931. Plant on terrace, leaf with basal lobes somewhat reflexed, the basal sinus sometimes closed, towards base by the slightly overlapping leaf margins.

GOSSEYIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#708 Gossypium Darwinii (?) Galapagos Islands, Torrey Pines.

The plant in Border 1 resembles #696 but the leaves and petioles are more pubescent, having a velvety feeling and are densely and conspicuously dotted on the upper surface with both large and small, dark brown oil glands, which are less conspicuous on the lower surface. Leaf nectary near base of midvein only, much longer than in #696. Leaf lobes shorter and broader, more abruptly acuminate than in #696.

(see description made in 1931)  
Plant on terrace is similar except that the brown dots are rather few and are hardly apparent on the upper surface and are not conspicuous on the lower surface. The leaf margins are not black as is the case in #696. Leaf nectary on lower part of midvein, only, rather small, linear. Petioles nearly as long as the leaf blades, very warty.

(dead 1931)  
Riverside (Sept. 26) Stems and petioles dark-brown, becoming nearly black, the petioles puberulent, not noticeably warty. Leaves copiously soft-pubescent above and densely so (almost tomentose) beneath with short hairs, longer ones on the veins, copiously speckled above with large and small brown dots, the veins purple, the pulvinus dark-brown, deeply 5-lobed, all lobes attenuate-acuminate, the upper ones ovate-lanceolate, the lower ones rather long and at right angles to the petiole, basal sinus shallow, open, rather narrowly triangular to broadly so, nectaries small but conspicuous, short-triangular, near bases of all 3 principal veins.

(dead 1931)  
Another plant at Riverside was noted as having leaf-nectaries variable in length.

94a

GOSYPIUM AND RELATIVES AT CALIFORNIA STATIONS.

# 708 Gossypium darwini (?) Galapagos Islands. Torrey Pines.  
Sept. 24, 1931 (Plant on terrace outside). Tree about 12 feet high and  
about 3 inches in diameter at base. Bark nearly black on the young  
branches, light brown on the old wood. Petioles much shorter than the  
leaf blades, warty, densely and persistently short-pubescent. Leaves dark  
green with a dull-brown pulvinus, persistently soft-pubescent on the veins  
and pulvinus above and on the whole surface below with short, mostly stellate  
hairs, very deeply and rather narrowly 5-lobed, the lobes oblong-lanceolate,  
long-acuminate, the long, narrow basal lobes spreading at right angles to  
the midvein, basal sinus shallow, open to the base or partly closed by the  
overlapping margins of the blade, nectary towards the base of the midvein,  
(sometimes a much smaller one on one or both of the principal lateral veins)  
small, rather prominent, usually about twice as long as wide (Two nectaries  
were observed on the midvein of one leaf).

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS

#708 Gossypium Darwinii (?) Galapagos Islands. Palm Springs,  
 Sept. 27, 1930. Plant in row 3. Leaves soon glabrous above and very  
 sparsely short-pubescent beneath, pulvinus unusually conspicuous, rich  
 purple-brown color, <sup>leaf-blade</sup> copiously but not very conspicuously brown-speckled  
 above, basal sinus frequently closed by the overlapping leaf margins, nectary  
 narrowly triangular, sharply pointed towards apex of leaf, often elongated.

Plant in row 7 (dead, 1931) evidently very similar to that in border 1  
 at Torrey Pines. Leaves more conspicuously brown-speckled than on any  
 other specimen of the Galapagos collection at Palm Springs.

Bard, Apr. 16, 1931. Resembles much more than the plant of #698  
 here) most of the Galapagos Islands plants in our collections. Leaves  
 deeply 3-lobed, very pubescent, conspicuously dark-brown spotted.

Palm Springs, Sept. 29, 1931. Plant less strict than some of the  
 Galapagos series as grown here (e.g. #636 and 637), young bark reddish-brown.  
 Leaves light green, rather deeply lobed with broad, ovate, long-acuminate,  
 overlapping, often dentate lobes.

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#709 Gossypium Darwinii, Galapagos Islands. Torrey Pines, on terrace, <sup>(dead 1931)</sup> Leaves rather densely pubescent with simple or stellate hairs on the larger veins above, on the whole surface below which is almost tomentose, dark green above and very conspicuously and abundantly speckled with dark brown, large and small spots, rather soft, buckled, very broadly 5-lobed, the lobes short-acuminate, basal sinus closed or nearly so by overlapping leaf-margins, nectary near base of midvein only, conspicuous, short.

Riverside (Sept. 26) <sup>(dead 1931)</sup> Older stems dark brown, nearly black. Leaves strongly short-pubescent above, especially on the large veins and pulvinus, densely so beneath, almost tomentose when young, grayish-green above, the exposed portions when young speckled with large and small brown dots, with a conspicuous dark but dull brown pulvinus, soft and flaccid, rather deeply 5-lobed, the upper lobes ovate-oblong, acute or short-acuminate, the lower lobes triangular-ovate, reflexed, often very strongly so, basal sinus deep but closed by the strongly overlapping leaf margins, nectary small, rounded triangular, near base of midvein and often on one of the principal lateral veins.

Palm Springs (Sept. 27) Plant in row  $\frac{3}{2}$  is similar to the one at Riverside but the lower leaf lobes not reflexed or very slightly so. Leaf nectaries very near the bases of the veins. <sup>^</sup>

Plant in row  $\frac{3}{2}$  at Palm Springs corresponds closely with the above description of the plant at Torrey Pines but the leaves are not brown-dotted and the nectary is very inconspicuous. The pulvinus is dull light-brown, the basal lobes at right angles to the midvein, the upper lobes often coarsely dentate.

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GOSSYPIMUM AND RELATIVES AT CALIFORNIA STATIONS

# 709 Gossypium darwini, Galápagos Islands. Differs from the other numbers referred to G. darwini in its much more pronounced pubescence and its redundancy of leaf tissue. Seems a distinct type, as represented at Riverside and Palm Springs (Note made in 1930).

Palm Springs, Sept. 29, 1931. The two plants are similar, less strict than #636 and 637. Leaves less deeply lobed than in most of the Galápagos series, lobes ovate, very broad, abruptly short-acuminate, often coarsely dentate, leaves exceptionally pubescent for the Galapagos series, of soft texture, more or less folded and buckled, the pulvinus dull light-brown, blades not evidently brown-dotted. Much the most pubescent of the series and less deeply and more broadly lobed than most of them. Resembles #703 at Palm Springs but the leaves are brighter green, less deeply lobed and more pubescent than in #703.

Bard, April 16, 1931. The plant here is similar to the plant of #708 at Bard but the leaves are often 5-lobed, are not spotted and are extremely pubescent.

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS

#636, 637, 696-9, 702-9 Gossypium Darwinii (?) Galapagos Islands.

Although the several numbers and even, in some cases, the individual plants of the same number differ considerably, they appear to constitute a rather definite type, evidently quite unrelated to G. peruvianum as represented by #662, 663 and 664. They all, including #700, which is probably G. Klotzschianum, are notable for the drooping position of the more or less flaccid leaves. (Note made in 1930).

Palm Springs, Sept. 27, 1930. Angular leaf-spot, very prevalent here this season, seems to have been especially severe on some of these Galapagos Island cottons.

99

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS

#711 *Gossypium* sp. (barbadense x hirsutum ?), Marquesas Islands  
(~~South American group~~) > Torrey Pines. (Description amended Sept. 24, 1931)  
Stems and petioles glabrous, petioles somewhat warty. Leaves entirely  
glabrous, dark green above with a dull, brownish or greenish pulvinus,  
very deeply 5-lobed, the upper lobes oblong-lanceolate or oblong-ovate,  
attenuate-acuminate, the rather long lower lobes at right angles or slightly  
reflexed, basal sinus shallow, broadly triangular, narrow or closed towards  
base, nectary near base of midvein, very small, rather prominent, nearly  
circular, a smaller nectary on one or both of the principal lateral veins.

Torrey Pines, Sept. 18, 1931. Involucre nearly equalling the  
corolla, the bracts separate or nearly so, with numerous very long and  
slender teeth. Calyx deeply dentate with broad, triangular teeth, oil  
glands very numerous. Petals bright yellow with spots about grade 8.  
Pollen cream-colored. Stigmas well-exserted, sometimes separate towards  
apex. Bolls 3-4-locked, very plump at base, tapering to a very sharp point,  
with long apical furrows, surface shiny, deeply pitted.

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS

#714 *Gossypium* sp. (barbadense x hirsutum ?) Marquesas Islands  
 (~~South American group~~) Palm Springs, Sept. 27, 1930. Glabrous  
 throughout. Leaves dark green and rather shiny above, firm, deeply  
 5-lobed, the upper lobes ovate or oblong-ovate, long-attenuate-acuminate,  
 the lower lobes at right angles to the midvein, basal sinus very narrow  
 or closed towards base, nectary near base of midvein, small but conspicuous,  
 triangular.

Palm Springs, Sept. 29, 1931. Bracts separate, broad, crisp,  
 with many very slender teeth. Calyx margin entire or nearly so, oil  
 glands very numerous. Corolla small for a South American cotton, from  
 shorter than to considerably exceeding the involucre. Petals bright  
 yellow with rather weak spots (grade 6 or 7). Stamens numerous, anthers  
and pollen cream-colored. Stigmas very long. Bolls 3-4-lock. Seeds  
 fuzz-less except for a very small basal tuft. Lint very short, white.

996

GOSYPIUM AND RELATIVES AT CALIFORNIA STATIONS

#715 *Gossypium* sp., Marquesas Islands (Mexican group?).

Palm Springs, Sept. 27, 1930. Two plants, glabrous throughout or very nearly so. Leaves bright-green to dark green and somewhat shiny above with a conspicuous red-brown or dark red pulvinus, rather shallowly 5-lobed, the upper lobes broadly ovate or triangular-ovate, abruptly but very sharply short-acuminate, the lower lobes scarcely more than coarse teeth, basal sinus shallow or deep, narrowly triangular, often closed near base in one plant, narrowed towards base in the other, nectary near base of midvein, small and rounded triangular in one plant, an inconspicuous, narrow slit in the other.

Palm Springs, Sept. 29, 1931. The plant in row 3 resembles #643 in row 2. The plant in row 7 is very different, with much longer dark green leaves having a very large, red to dark brown pulvinus, the leaves rather shallowly and very broadly 5-lobed, firm-textured, glabrous. May be barbadense x hirsutum.

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GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS

#716 Gossypium Hopi, Arizona (Mexican group). Palm Springs  
Sept. 27, 1930. The plant in row 7 is typical but the plant in row 6  
evidently is G. Hopi x G. hirsutum F<sub>1</sub> as indicated by the more compact  
habit, bright red leaf-pulvinus, larger and much more coarsely toothed  
involucre and large, occasionally 5-lock boll.

Palm Springs, Sept. 29, 1931. The hybrid plant in row 6 has the  
seeds completely covered with greenish fuzz.

#717 Gossypium hirsutum, Guatemala (Mexican group) Torrey Pines,  
Sept. 21, 1931. Boll 5-lock, small, nearly spherical, very short-pointed,  
surface Upland-like.

#723 and 724 Gossypium hirsutum, Rhodesia (Mexican group)  
Torrey Pines, Sept. 16, 1931. Evidently hirsutum but one or more of the  
calyx teeth are subulate-attenuate. There is considerable variation in  
boll shape, those of #723 being usually longer and more pointed than those  
of #724.

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#725 Gossypium Nanking (?), Korea (Asiatic group). Torrey Pines.

Two plants, one flowering. Stems dark brown, becoming almost black, rather densely short-pubescent as are the dark brown petioles. Leaves sparsely pubescent especially on veins of the lower surface, bright green with red pulvinus, rather irregularly and not very deeply 3-5-lobed, the upper lobes ovate or oblong-ovate and short acuminate, midlobe often slightly contracted at base, the lower lobes (sometimes wanting) very short, nearly at right angles or ascending, basal sinus scarcely any, nectary rather conspicuous, round or short-elliptical, near base of midvein and occasionally smaller ones on one or both principal lateral veins. Pedicels, shortly before anthesis, very long, spreading horizontally or nearly so. Involucre exceeding the very small corolla, bracts rather soft, pubescent, without external nectaries, somewhat connate, with few short teeth. Calyx slightly or rather deeply and sharply dentate, oil glands few but conspicuous, nectaries at base between bracts 3, large, inverted delta-shaped. Petals light yellow with huge mahogany-red spots. Filaments pink. Pollen orange-yellow. Stigmas long-exserted.

Torrey Pines, Sept. 16, 1931 Leaf basal sinus often rather deep and narrow. Pedicels of moderate length, often declined or pendent at and after anthesis. Involucre nearly equalling the small corolla, the bracts sometimes rather strongly connate, their external nectaries present but apparently not functional, their teeth erect or slightly incurved. Petal spots occupying nearly  $\frac{1}{3}$  the area of the petal. Stamens rather numerous for an Asiatic cotton. Bolls 3-lobed, ovoid, small, from short-pointed to rather long-pointed, with a pale green apical furrow.

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#726 Gossypium hirsutum (received as G. Manking) Korea (Mexican group). Torrey Pines. Two plants. Stems and leaves Upland-like, one plant typically Upland in its flowers, the calyx-teeth long acuminate, petals spotless, the other plant with weakly spotted petals (grade 4-5) the stigmas exceptionally long, flower otherwise Upland-like.

Riverside (Sept. 26). Two plants, <sup>(one dead 1931)</sup> like those at Torrey Pines, very pubescent, bolls small, seeds only sparsely fuzzy. A third plant also labelled #726 (at north end of row 13 in the north block) resembles one of the Florida Tree cottons, being glabrous throughout with shallowly 3-lobed leaves, the lobes triangular-ovate, rather conspicuously dotted with small black oil glands.

Palm Springs (Sept. 27) Two plants, <sup>(one dead, 1931)</sup> Upland-like but have very small, sharply-pointed, 5-lock bolls. Involucre and flower Upland-like except that the calyx is very shallowly dentate.

Torrey Pines, Sept. 16, 1931. Bolls 4-lock, ovoid, or oblong-ovoid, sharp-pointed, surface Upland-like.

Palm Springs, Sept. 29, 1931. Evidently is G. hirsutum but small in all its parts.

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GOSSEPIUM AND RELATIVES AT CALIFORNIA STATIONS

#727 Gossypium Hanking, Korea (Asiatic group). Torrey Pines,  
Sept. 1930. Two plants. Similar to #725 but leaves deeply lobed,  
the upper lobes oblong-ovate to ovate-lanceolate, somewhat more acuminate  
than in #725, midlobe distinctly contracted at base, base of leaf-blade  
subcordate, truncate or subcuneate. Leaves copiously pubescent on both  
surfaces and on the margin, densely so on the petiole, with mostly very  
short, stellate hairs. Pedicels as in #725.

Palm Springs, Sept. 27, 1930. Leaves puberulent on both surfaces,  
bright green with a very small, red pulvinus, deeply 5-lobed, lobes oblong-  
lanceolate, acute or subacuminate, midlobe narrowed towards base, nectary  
near base of midvein, inconspicuous, triangular, pedicels short, declined  
often strongly so, involucre shorter than the small corolla, bracts strongly  
connate with very few, very short teeth, calyx nearly entire, petals pale  
yellow with huge, intensely red spots, boll 3-lock, tapering to a very  
sharp point, pale green.

Torrey Pines, July 15, 1931. Pedicels rather long, pendent at  
anthesis and even before. Corolla good-sized for an Asiatic cotton,  
much surpassing the involucre. Petals light yellow with very large,  
dark red spots. Stamens few. Stigmas well-exserted.

Torrey Pines, Sept. 21, 1931. Bolls 3-lock or 4-lock, ovoid or  
oblong-ovoid, abruptly sharp-pointed, with long and deep apical furrows,  
surface light-green, shallow-pitted. Seeds completely covered with short,  
white, fuzz. Lint very short and coarse, white.

Palm Springs, Sept. 29, 1931. Bracts often nearly entire. Petals  
bright yellow. Stigmas long. Bolls 3-lock, small. Seeds covered  
with short, whitish fuzz. Lint very short, white.

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#729 Gossypium herbaceum, Turkestan (Asiatic group). Torrey Pines.  
(both dead 1931)  
Two plants, ^ Stems and petioles dark brown, rather densely short-pubescent and sparsely villous, Leaves bronze green and shiny above with a small dark-brown pulvinus, short-pubescent on both surfaces and villous on the veins beneath, somewhat buckled, little longer than wide, shallowly 5-lobed, the upper lobes very broad-ovate, obtuse and macronate or bluntly short-acuminate, midlobe somewhat contracted at base, the lower lobes short and rounded, at right angles on somewhat ascending, basal sinus very shallow and very broadly triangular, nectary small but conspicuous, circular, near base of midvein and occasionally on one of the principal lateral veins. Pedicels (before anthesis) short, erect to strongly declined.

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#730. Gossypium hirsutum, Turkestan (Mexican group). Torrey Pines.  
(both dead 1931)  
Two plants, ^ one flowering, Upland-like in stems and leaves. Some of the calyx teeth are very long-acuminate and the stigmas are long, otherwise the flowers are typical Upland.

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#731 Gossypium herbaceum. Turkestan (Asiatic group).

Torrey Pines. Two plants, one flowering. <sup>(both dead 1931)</sup> Similar in most of the

stem and leaf characters to #729 but stems and petioles lighter brown,

leaves bright green and shiny above with a dull-brown pulvinus, ~~densely~~  
<sup>pubescence as in #729,</sup> soft-pubescent, especially beneath, basal sinus deeper but open and

broadly triangular. Pedicels rather short, erect to somewhat declined.

Involucre nearly equalling to slightly exceeding the very small corolla,

bracts soft, very pubescent, strongly connate, with short rather broad

teeth and one or no external nectaries. Calyx very shallowly crenate

or irregularly dentate with slender teeth, oil glands remarkably few,

nectaries (2 or 3) at base between the bracts, very large, inverted

delta-shaped. Petals pale yellow with very large crimson spots. Pollen

orange-yellow. Stigmas short.

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#732 Gossypium hirsutum. Turkestan (Mexican group). Torrey Pines.

Two plants, typical Upland in stems, leaves and flowers, some of the calyx  
teeth setose-prolonged.

Torrey Pines, Sept. 16, 1931. Bolls nearly spherical,  
very short-pointed, 4-5-lobed, without apical furrows,  
surface Upland-like.

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#733 Gossypium herbaceum, Turkestan (Asiatic group) Torrey Pines.

Two plants, similar in stem and leaf characters to #731 (no flowers).

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS

#734 Gossypium herbaceum, Turkestan. (Asiatic group)  
 (one dead 1931)  
Torrey Pines, Sept. 1930. Two plants, similar in stem and leaf  
 characters to #731 (no flowers).  
 ^

#735 Gossypium herbaceum, Turkestan. (Asiatic group)  
 (both dead 1931)  
Torrey Pines, Sept. 1930. Two plants, one flowering, similar in  
 stem, leaf and flower characters to #731 but with only one nectary  
 at the base of the calyx, the calyx margin irregularly shallowly cleft  
 and erose. Pedicels short, erect to slightly declined.  
 ^

#736 Gossypium herbaceum, Turkestan. (Asiatic group)  
 (both dead 1931)  
Torrey Pines, Sept. 1930. Two plants, similar in stem and leaf  
 characters to #731 (no flowers).  
 ^

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS

#737 *Gossypium* sp. Torrey Pines, Sept. 16, 1931. Typical South American in foliage and calyx. Involucral bracts broad with many long teeth. Bolls 3-lock, long and slender, attenuate to a very sharp point, surface copiously but shallowly pitted, shiny, dark green. Seeds fuzless, except a minute tuft at base. Lint very short, nearly white.

#738 *Gossypium* sp. Torrey Pines, Sept. 16, 1931. Resembles #737 in leaves, bracts and bolls except that the mid-lobe of the large, very deeply lobed leaf frequently is coarsely toothed.

#739 *Gossypium herbaceum* (received as *G. hirsutum*) Turkestan  
(one dead 1931)  
(Asiatic group) Torrey Pines, Sept. 1930. Two plants, similar in stem, leaf and flower characters to #731. Pedicels very short, before anthesis erect to slightly declined.

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS

#740 Gossypium hirsutum, Turkestan (Mexican group) Torrey Pines.

Sept. 1930. Typical Upland, calyx as in #732, extraordinarily long-dentate.

Torrey Pines, Sept. 21, 1931. Bolls typical Upland.

#741 Gossypium hirsutum, Turkestan (Mexican group). Torrey Pines.

Sept. 1930. Typical Upland.

Torrey Pines, Sept. 21, 1931. Bolls typical Upland.

#742 Gossypium herbaceum, Turkestan (Asiatic group). Torrey Pines.

Sept. 1930. Two plants, <sup>(one dead 1931)</sup> similar to #731 but taller and stricter than most of this series.

Torrey Pines, Sept. 21, 1931. Involucre with few, short, broad teeth.

Boll 3-lock, small, but exceeding involucre, short-ovoid, very plump, very short-pointed, surface light green, very smooth.

GOSYPIUM AND RELATIVES AT CALIFORNIA STATIONS

#743 Gossypium herbaceum, Turkestan (Asiatic group). Torrey Pines,

(dead, 1931)

Sept. 1930 <sup>^</sup> Resembles #729 in stem, leaf and flower characters.

Bard, Oct. 2, 1931. Involucral bracts strongly connate, having

6-9 short, broad, acuminate teeth, sparsely short/stellate, pubescent.

(external) of base (internal)

Nectaries <sup>^</sup> of bracts and below calyx, well-developed but the former apparently not functional. Calyx shallowly crenate with broad, rounded teeth.

Corolla small but much exceeding the involucre. Petals crinkle-margined,

bright yellow (fading rose-red) with dark red spots occupying about 1/5

the area. Stamens rather numerous for an Asiatic cotton, extending

nearly to base of column. Pollen grade 6. Stigmas short but well-

exserted. Bolls 3-4 lock, small, nearly spherical with concave locks,

pointless or nearly so, surface very smooth, pale green turning rose-red,

when mature the locks separating above but seed-cotton not extruded.

Seeds densely covered with white fuzz. Lint white.

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GOSSTIUM AND RELATIVES AT CALIFORNIA STATIONS

#744 Gossypium herbaceum. Turkestan (Asiatic group). Torrey Pines,  
Sept. 1930. <sup>(dead 1931)</sup>  
Like #731 in stem and leaf characters (no flowers).

#745 Gossypium herbaceum. Turkestan (Asiatic) Torrey Pines,  
Sept. 1930. Two plants, resembling #731 in stem and leaf characters  
(no flowers). Pedicels (before anthesis) short, erect to horizontally  
spreading.

#746 Gossypium herbaceum. Turkestan (Asiatic group) Torrey Pines,  
Sept. 1930. Two plants resembling #731 in stem and leaf characters (no flowers).

Torrey Pines, Sept. 16, 1931. Bracts connate, soft, pubescent, with  
8 or 9 short, broad teeth, nectaries vestigial. Calyx shallowly crenate with  
very broad lobes, oil glands few but conspicuous. Corolla very small,  
barely exceeding the involucre. Petals yellow (grade 4) with good-sized,  
dark red spots. Stamens few. Pollen orange. Stigmas not exceeding the  
stamens. (This flower perhaps not well-developed). Bolls 3- or 4-lock,  
scarcely longer than broad, the faces of the locks concave, pointless, apical  
furrows sometimes well-developed, surface light green, smooth.

Gossypium herbaceum, as represented by #729, 731, 733-6, 739 and  
742-6 at Torrey Pines, has foliage much more like that of G. obtusifolium  
than of G. Hanking.

GOSYPIUM AND RELATIVES AT CALIFORNIA STATIONS.

#749 Gossypium obtusifolium (?) Algeria (received as G. Wanking soudanensis (Asiatic group). Torrey Pines, Sept. 1930. Two plants, closely resembling #731 (G. herbaceum) except that the stems and petioles are conspicuously villous and the small leaf-pulvinus is often bright red. Is certainly not G. Wanking, the leaf lobes being rounded.

Torrey Pines, Sept. 19, 1931. Pedicels often strongly reflexed in bud but that of the one flower open to-day is ascending. Involucre much shorter than the small corolla, the bracts rather strongly connate, broadly ovate, deeply cordate, with 9 or 10 very short, broad teeth, soft, densely stellate-pubescent, their nectaries apparently not functional. Calyx margin merely undulate, oil glands few but conspicuous, black, the nectaries large, inverted delta-shape with rounded angles. Petals broader than long, crinkly, light yellow with dark red spots occupying nearly 1/3 the area of the petal. Stamens few, confined to upper half of column. Pollen orange. Stigmas well-exserted.

#750 Gossypium sp. Brazil (received as Moco cotton). Torrey Pines, Sept. 1930. Two plants, resembling G. hirsutum. Torrey Pines, Sept. 16, 1931. Stems and petioles extremely hairy.

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS

#751 (and 751A, B and C) Gossypium barbadense (South American group. Torrey Pines, September, 1930. Two plants of each, all typical Egyptian cotton. The leaves are copiously pubescent but scarcely more so than in the so-called Pima plants at south end of row 2, border 1. The calyx margin is from strongly undulate to shallowly crenate.

#751 Giza 3-U-4. Sept. 21, 1931. Bolls 3-4-lock, ovoid, rather short, very plump, very broad at base, sharp-pointed, surface dark green, rather deeply pitted. Seeds fuzzless except for a very small basal tuft. Lint rather short, pale buff.

#751A Giza 3-U-5. Bolls as in #751 except that many of them have short, deep apical furrows. Seeds with slightly more basal fuzz than in #751. Lint very short, pale buff.

#751B Giza 3-L-2. Similar to #751 in bolls and seeds but the (pale buff) lint apparently is shorter.

#751C Giza 3-L-3. Bolls as in #751 but with occasional apical furrows. Seeds as in #751. Lint apparently longer than in the other 3 selections, pale buff.

#751, etc. Torrey Pines (Sept. 25, 1931). Examination of the plants in the lower (bulk) planting shows that in all 4 numbers <sup>^</sup>apical furrows are occasional. They are perhaps more frequent in #751C than in the others. This planting ( ratooned from 1930 seeding) is extraordinarily fruitful and early this year. Many bolls are now open. The bolls are large and fine looking.

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GOSSEPIUM AND RELATIVES AT CALIFORNIA STATIONS

#752 Gossypium hirsutum, Cambodia cotton (Mexican group).

Torrey Pines, Sept. 24, 1931 (on terrace, outside). Typical  
hirsutum in all characters. Bolls 4-5-lock, ovoid, rather abruptly  
and bluntly pointed. Seeds densely covered with pure white fuzz.  
Lint very short, white.

#753 Gossypium hirsutum, Cawnpore cotton (Mexican group).

Torrey Pines, Sept. 24, 1931 (on terrace, outside). Resembles #752  
but the bolls are shorter, more abruptly- and shorter-pointed and the  
seed fuzz is not so white.

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GOSSEIUM AND RELATIVES AT CALIFORNIA STATIONS

C.B. 754 Gossypium nanking (indicum) (Asiatic group) Torrey Pines  
(plant on terrace) Sept. 19, 1931. Much-branched, branches slender,  
stems, petioles and veins of lower leaf surface villous. Leaves pubescent  
on both faces, 5-lobed but the basal lobes scarcely more than coarse teeth,  
mid-lobe about  $\frac{3}{5}$  the length of the leaf, oblong-lanceolate, short-acuminate,  
basal sinus very shallow or none, nectaries none. Pedicels at and after  
anthesis usually somewhat reflexed. Involucre much shorter than the small  
corolla, the bracts soft, pubescent, strongly connate, with 3 or 4 very short  
teeth. Calyx margin shallowly orenate with broad lobes, oil glands numerous  
and conspicuous, black. Petals bright yellow with dark red spots occupying  
 $\frac{1}{4}$  the area of the petal. Stamens numerous for an Asiatic cotton, filaments  
pink, pollen orange. Stigmas well-exserted. Boll 3 to 5-loc, short  
ovoid, very short-pointed, with apical furrows often well-developed, surface  
pale green, pitted. Seeds densely fuzzy. Lint short, white.

May 15, 1935

GOSYPIUM AND RELATIVES AT CALIFORNIA STATIONS

#763 Gossypium stocksii, Riverside, Aug. 22, 1934. A small plant with trailing branches and 5-lobed leaves with rounded, very obtuse lobes such as in G. obtusifolium <sup>obtusum</sup> but much smaller. Bractlets of involucre widely separated, clawed, very unlike those of cultivated Asiatic cottons, deeply lacinate. Corolla only about 15 mm. high, the petals near sulphur-yellow (V), with relatively large but not very intense pomegranate-purple (XII) spots. Pollen paler than baryta-yellow (IV).

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GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS

#762 Gossypium barbadense, Egypt (South American group) Sakha #4.  
Torrey Pines, Sept. 18, 1931. The vegetative and flower characters are typically Egyptian. Bolls Sakel-like, 3-lock, short, very plump, abruptly and sharply short-pointed, surface shiny and rather deeply pitted.

#764 Gossypium obtusifolium (?) Wagad cotton, India (Asiatic Group)  
Torrey Pines, Sept. 22, 1931. Two plants. Stems and petioles extremely villous. Leaves light yellowish green with a very small red-brown pulvinus, sparsely pubescent above with short appressed, simple or branched hairs, densely so beneath and on margins with mostly stellate hairs and scattered, longer, simple ones on the large veins, rather shallowly 5-lobed with broad rounded mucronate lobes, the midlobe somewhat contracted at base, basal sinus open and shallow, nectary towards base of midvein (and sometimes one of the principal lateral veins) rather prominent, broader than long. Pedicels very short, densely villous, spreading or sometimes sharply deflexed even before anthesis. Involucre (one flower only) less than 1/2 the length of the relatively large corolla, the bracts strongly connate, rather soft, stellate-pubescent, with about 9 very short teeth. Calyx margin merely undulate, glands rather few but conspicuous (black). Petals light yellow with dark red spots occupying about 1/4 the area of the petal. Stamens occupying most of the length of the staminal column, filaments white, pollen orange. Stigmas about equalling the uppermost stamens.

GOSYPIUM AND RELATIVES AT CALIFORNIA STATIONS

#766, 768, 769, 773, 775(?), 778, 779 Gossypium nanking.

Torrey Pines, Sept. 22, 1931. These plants (in border 1 row 2 with #772) closely resemble that number except in minor details. #769, for example, has the calyx merely crenulate, the corolla considerably surpasses the involucre and the bolls are longer and longer-pointed.

GOSYPIUM AND RELATIVES AT CALIFORNIA STATIONS

#772 Gossypium nanking, Chosen (Asiatic group) Torrey Pines,  
 Sept. 22, 1931. Two plants. Stems tall, slender, becoming quite  
 woody below, young bark dark brown, stems and petioles cinereous with  
 very short, stellate hairs. Leaves dark green with a dull brown  
 pulvinus, sparsely short-pubescent (becoming nearly glabrous) above,  
 short-pubescent beneath with stellate hairs and longer simple ones on  
 the principal veins, 5-lobed, the upper lobes broadly ovate, short-  
 acuminate, the lower lobes hardly more than coarse teeth, at right angles  
 to the midvein, basal sinus very shallow to fairly deep, open, nectary  
 at some distance above the base of the midvein, short, fairly prominent.  
 Pedicels long, more or less reflexed after anthesis. Involucre about  
 equalling the small corolla (one flower), the bracts nearly free to  
 moderately connate, rather crisp, sparsely short-pubescent, with <sup>about</sup> 6 very  
 short teeth. Calyx sharply dentate, oil glands rather few but  
 conspicuous, black. Petals light yellow with dark mahogany-red spots  
 occupying about 1/4 the petal area. Stamens rather numerous, filaments  
 purple, pollen orange-yellow. Stigmas well-exserted. Bolls 3-4-loc,  
 small, ovoid, plump, from nearly pointless to abruptly short-pointed  
 with a sharp point, often with long apical furrows, surface very light  
 green, rough, deeply pitted. Seeds completely covered with white fuzz.  
 Lint short and coarse, white.

May 15, 1935

GOSSYPIMUM AND RELATIVES AT CALIFORNIA STATIONS

#781 G. sanguineum (Asiatic group). Riverside, Aug. 22, 1934  
(row 6). Petals approximately spinel-red (XXVI) on the upper edge  
and exposed outer surface, shading to nearly white around the spot  
which is very large, covering nearly 1/2 of the petal, between pomegranate-  
purple and Bordeaux (XII). Anthers of a nondescript dark-brown color,  
pollen apparently greenish yellow.

GOSYPIUM AND RELATIVES AT CALIFORNIA STATIONS

#783 Gossypium nanking, India (Asiatic group). Torrey Pine,  
 Sept. 1931. Stems tall, erect, these and the petioles very villous.  
 Leaves villous on both surfaces, especially along the veins, with mostly  
 simple hairs, deeply and rather narrowly 5-lobed, the upper lobes more  
 or less overlapping and frequently with a large tooth at base, basal sinns  
 shallow, broadly triangular, nectaries small, sometimes on all 3 principal  
 veins (near base) sometimes lacking on all. Pedicels pendant at and  
 after anthesis. Involucre considerably shorter than the corolla, bracts  
 strongly connate, soft, pubescent, with 4 to 6 very short teeth, their  
 nectaries apparently non-functional. Calyx dentate with acute or  
 acuminate teeth, oil glands rather sparse but very conspicuous (black).  
 Petals light yellow with very dark mahogany-red spots occupying about 1/4  
 the area of the petal. Stamens few, pollen rich orange. Stigmas short  
 or rather long, well-exserted, free at apex. Bolls small, 3-lobed,  
 oblong-ovoid, attenuate to a very sharp point, surface pale green, deeply  
 pitted. Seeds covered with short greenish fuzz. Lint very short,  
 coarse, white.

May 15, 1935

GOSYPIUM AND RELATIVES AT CALIFORNIA STATIONS

#785 G. neglectum (Asiatic group). Riverside, Aug. 22, 1934  
(row 6). Two plants, alike in flower colors (except pollen). Petals  
pale greenish yellow (V), the spots very large and solid, between pome-  
granate-purple and Bordeaux (XII). Pollen light cadmium in one plant,  
between light cadmium and empire yellow (IV) in the other.

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GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS

#786 Gossypium neglectum\* (Asiatic group) Torrey Pines,  
Sept. 21, 1931. Stems tall, erect, bark dark brown, stems and petioles  
densely villous with simple hairs. Leaves deeply 5-lobed, the upper  
lobes oblong-lanceolate, acuminate, somewhat overlapping their sinu, basal  
lobes spreading at a right-angle, bearing a short rounded lobe or coarse  
tooth, basal sinus open, triangular, leaf dark green with a dull-brown  
pulvinus, villous on the veins, especially beneath, with simple hairs,  
also short-pubescent on both surfaces with often stellate hairs, nectary  
towards base of midvein inconspicuous and sometimes absent. Pedicels  
ascending in bud and at anthesis, sometimes reflexed after anthesis.  
Involucre surpassing the small corolla (1 flower only) the bracts moderately  
connate or nearly separate, soft, very pubescent, with 6 or 7 erect, ciliate  
teeth that are long for an Asiatic cotton, involucrel nectaries apparently  
non-functional. Calyx relatively high, short-dentate, with conspicuous  
black oil glands. Petals nearly white, with dark red spots occupying  
about 1/3 the area. Stamens numerous, occupying most of the length of  
the column, pollen orange-yellow. Stigmas well-exserted, free at apex.  
Bolls 3-4-lock (mostly 4) short-ovoid to nearly spherical, shorter than  
involucre, abruptly short- and sharp-pointed, often with long and deep  
apical furrows, surface light-green, rough, deeply-pitted. Seeds and lint  
as in #783.

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\* So-labelled but seems very close to G. nanking. Plant very similar  
to the adjacent #783, labelled G. nanking.

GOSYPIUM AND RELATIVES AT CALIFORNIA STATIONS

#790 Gossypium barbadense, Cameroon (South American group).

Torrey Pines, Sept. 22, 1931. Typical South American in vegetative characters. Bracts nearly separate, deeply cordate, with many long, rather broad teeth. Calyx margin crenulate. Bolls (very young) 3-lock, tapering, surface dark green, deeply pitted.

#792, 793, 794, 796, 797, 798 Gossypium herbaceum, Turkestan (Asiatic)

Torrey Pines, Sept. 22, 1931. All are typical herbaceum in vegetative characters (no flowers). Boll (on #797 only) 4-lock, broader than long, very plump, almost pointless, the faces concave, surface light green and very smooth. Seeds immature (on #797) covered with short white fuzz. Lint white.

#799, 801 to 806 inclusive, 811, 812, 813, 815, 816, 818, 819, 820, 821

Gossypium hirsutum, Turkestan (Mexican group) Torrey Pines, Sept. 22, 1931. All are typical hirsutum in vegetative characters, flowers, bolls, seeds and lint.

#808 Gossypium herbaceum, Turkestan (Asiatic group). Torrey Pines,

Sept. 1931. Typical in vegetative characters. Involucral bracts rather strongly connate. No flowers nor bolls.

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS

#809. Gossypium nanking (?) Turkestan (Asiatic group).

Torrey Pines, Sept. 22, 1931. Looks different from the adjacent plant of G. herbaceum (#808) the stems and leaves being darker colored and the leaves more deeply and narrowly lobed. Boll 4-lock, nearly spherical, abruptly short-pointed, the point sharp, with long apical furrows, surface light green, pitted. Seeds densely covered with pure white fuzz. Lint short, white.

#814. Gossypium herbaceum. Turkestan (Asiatic group).

Torrey Pines, Sept. 22, 1931. Typical in vegetative characters. No flowers nor bolls.

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS

#817 Gossypium nanking, "Million Dollar," Turkestan (Asiatic group). Torrey Pines, Sept. 22, 1931. Stems tall, erect, slender, dark brown, cinereous-pubescent, petioles cinereous-pubescent and sparsely villous. Leaves dark green with a reddish-brown pulvinus, stellate-pubescent on both faces, with very short hairs, and villous on the larger veins beneath, with longer, simple hairs, rather deeply 5-lobed, the upper lobes oblong-ovate, acutish, the lower lobes (often well-developed) at right angles to the midvein. Pedicels long, spreading or reflexed. Involucral bracts rather strongly connate, crisp, with 4 to 7 very short, broad teeth. Boll (one only) 4-lock, large for an Asiatic cotton, somewhat longer than broad, very plump, abruptly short-pointed with a sharp point, surface pale green, rather deeply pitted.

122  
GOSSYPIMUM AND RELATIVES AT CALIFORNIA STATIONS

#849 Gossypium hirsutum (?) Mexico (Mexican group) Torrey Pines,  
Sept. 22, 1931. Typical hirsutum in all characters except that the  
petals are pale yellow, the pollen yellowish and the bolls very small,  
3-lock or 4-lock and with surface more deeply pitted and having more  
conspicuous oil glands than is usual in Upland cottons.

#854 Gossypium hirsutum, Salvador (Mexican group) Torrey Pines,  
Sept. 22, 1931. Typical hirsutum in all respects.

#864 Gossypium sp. Mexico. Torrey Pines, Sept. 23, 1931.  
Plants very young, glabrous or nearly so, leaves deeply and narrowly  
lobed. A peculiar type.

Gossypium transvaalense Watt

(Riverside, Calif., Sept. 9, 1935)

CB #1058. Very similar in vegetative characters to G. africanum (obtusifolium?). Involucel about 1/2 as high as the corolla, the bractlets somewhat connate, broadly ovate, deeply lacinate with lance-subulate teeth. Calyx dentate with short, deltoid teeth, oil glands few. Corolla about 3.5 cm. high, the petals between Martius and picric yellow (IV) with conspicuous, solid spots approaching Bordeaux in color (XII). Pollen between apricot yellow and Empire yellow (IV). Column with stamiferous portion about 4/5 of the whole. Filaments short, white. Exserted portion of pistil very short.

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

Gossypium barbadense Sea Island cotton (?) Torrey Pines.  
Three small plants at south end of row 2, border 1, a little off the row (east) from the Pima plants, have a typical barbadense corolla, with crenulate calyx and plump, very sharp-pointed, shiny, Sea Island-like bolls.

Gossypium barbadense, Egyptian cotton. Torrey Pines. Several varieties from Egypt in border 2, row 5. All have typical barbadense flowers but as compared with Pima at Sacaton the bracts are nearly always broader and with broader teeth and the calyx is nearly always crenate. Do conditions at Torrey Pines favor these expressions of the characters?

Gossypium, Sea Island x Columbia (?) Torrey Pines, in border 2, row 5. Three plants, only one flowering, appear to be G. barbadense in all characters and are extremely susceptible to the angular leaf spot disease.

Nectaries in *Gossypium*

(Riverside, Calif., September, 1936)

Old World Species and Hybrids.

1. One to (usually) three usually large, inverted delta-shaped nectaries at base of calyx between the bractlets, apparently none on outside of involucre: 743 herbaceum (large); 393, 824 Nanking; 619 intermedium (large); 1061, W14 africanum (large); 422 cernuum (large); 1066 transvaalense (large); 620 arboresum (large); 1045, 1046 herbaceum x arboresum F<sub>1</sub> (Rao's Green Seed); W48 herbaceum x neglectum F<sub>1</sub> <sup>1/</sup>; W125 (herbaceum x neglectum F<sub>1</sub>) x herbaceum, F<sub>1</sub>; W8 herbaceum x cernuum F<sub>2</sub>; W45 sanguineum x africanum F<sub>1</sub>; 646 American x Asiatic F<sub>1</sub> (large).

2. Calyx nectaries none or rudimentary, oil-glands extending to base of calyx: 785 neglectum <sup>2/</sup>; 1051 anomalum; 564 Sturtii; 787 sanguineum; 763 Stocksii; W99 sanguineum x Stocksii F<sub>1</sub>; W111 herbaceum x Sturtii F<sub>1</sub>; W124 (sanguineum x africanum F<sub>1</sub>) x sanguineum F<sub>1</sub>; W79 Nanking x thespesioides F<sub>1</sub>; W27 sanguineum x anomalum F<sub>1</sub>.

New World Species and Hybrids.

3. Calyx nectaries present but usually much smaller than in Asiatic species, often transversely elongate: 1073, W5 barbadense; 542 contextum; 541 patens; 437 punctatum; 716 Hopi; W28 barbadense x tomentosum F<sub>1</sub> (nectaries hairy); W90 hirsutum x tomentosum F<sub>1</sub> <sup>3/</sup>; hirsutum x cernuum F<sub>1</sub> <sup>4/</sup>.

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<sup>1/</sup> Nectaries large, pubescent, but perhaps non-functional.

<sup>2/</sup> Observable and somewhat pubescent but bearing oil-glands and perhaps non-functional.

<sup>3/</sup> Perhaps not functional.

<sup>4/</sup> Small but sharply defined.

New World Species and Hybrids, Cont'd.

4. Calyx nectaries none: 1057, 1059, W24, W34 hirsutum; 527 tomentosum;  
101 Davidsonii; 867 Armourianum; 112 thespesioides; W41 Harknessii x  
Armourianum F<sub>1</sub>; W36 thespesioides x Sturtii F<sub>1</sub>; W10 Davidsonii x Elotzschianum  
F<sub>1</sub>; W9 Armourianum x thespesioides F<sub>1</sub>; W44 hirsutum x thespesioides F<sub>1</sub>.

BOLL PUBESCENCE, RIVERSIDE, SEPT. 6, 1934

American Cultivated Cottons, Mexican Group

- C.B. 531, G. purpurascens, <sup>plant 1.</sup> <sub>1</sub> Boll about 1/2 grown, glabrous.  
C.B. 672, G. schottii (X ?) two plants. Bolls about 1/2 grown, glabrous.  
C.B. 694, G. jamaicense (?) Florida Tree, plant 1. Boll well developed,  
glabrous.  
C.B. 421, G. jamaicense (?) Florida Tree, plant 1. Two bolls fully grown  
or nearly so, glabrous.

W 16 G. sp., Florida Wild Cotton, plant 1. Two bolls about 1/2 grown,  
glabrous.

- C.B. 437, G. punctatum, plant 1. Very young boll, glabrous.  
W 24, G. hirsutum, Acala var. (family 22 ~~7~~), two plants. Glabrous.  
W 12, G. hirsutum, lintless, plant 1. Glabrous.  
C.B. 541, G. patens, plant 1. Boll nearly fully grown, glabrous.  
C.B. 716, G. hopi, plant 1. Glabrous.  
C.B. 723, G. hirsutum from Rhodesia. Glabrous.  
C.B. 396, G. morrilli (?) Glabrous.

American Cultivated Cottons, South American Group

- W 23, G. barbadense, Pima var. (PHE), two plants. Glabrous.  
C.B. 551, G. auritum. Boll more than 1/2 grown, has a few hairs in the sut  
C.B. 702, G. darwini (?) Very doubtful darwini, resembles peruvianum  
closely. Glabrous.  
C.B. 204 A. G. barbadense (?) Brown Mohaux. Boll nearly full grown, glabr  
C.B. 204 B. G. barbadense (?) White Mohaux. Boll nearly full grown, glabro

BOLL PUBESCENCE, RIVERSIDE, SEPT. 6, 1934

South American Group, cont'd.

- C.B. 675, G. brasiliense, two plants. Boll at least 1/2 grown, glabrous.  
C.B. 662, G. peruvianum, plant 1. Boll nearly full grown, glabrous.  
C.B. 709, G. darwinii (?) plant 1. Bolls half grown, glabrous.  
C.B. 527, G. tomentosum, plant 1. Glabrous.

Asiatic Cultivated Cottons.

- C.B. 787, G. sanguineum, plant 1. Glabrous.  
C.B. 784, G. nanking, plant 1. Glabrous.  
C.B. 786, G. neglectum, white-flowered, plant 1. Glabrous.  
C.B. 785, G. neglectum. Two plants. Glabrous.  
C.B. 820, G. arboreum, two plants. Boll on plant 1 one day old, on  
plant 2 nearly full grown. Both glabrous.  
C.B. 749, G. obtusifolium, plant 1. Glabrous.  
C.B. 419, G. obtusifolium, two plants. Glabrous.  
C.B. 619, G. intermedium, two plants. Glabrous.  
W 15, G. cernuum (?), plant 1. Glabrous.  
C.B. 422, G. cernuum, two plants. Pubescent sparsely in sutures near base  
of boll, when young,  $\frac{1}{2}$  glabrous above. *towards apex.*  
C.B. 393, G. nanking, two plants. Glabrous.  
C.B. 824, G. nanking, plant 1. Glabrous.  
C.B. 743, G. herbaceum, two plants, glabrous.  
C.B. 1023, G. herbaceum, plant 1. Glabrous.

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$\frac{1}{2}$  The discovery of this sparse pubescence very near the base of the boll  
in C.B. 422 makes it desirable to re-examine the Asiatics.

BOLL PUBESCENCE, RIVERSIDE, SEPT. 6, 1934

Wild Species

- C.B. 632, G. sturtii, two plants. Glabrous.  
C.B. 867, G. armourianum, two plants. Glabrous.  
C.B. 861, G. harknessii, two plants. Bolls from one day old to nearly full-grown. Glabrous.  
C.B. 700, G. klotzschianum, two plants. Bolls 1/3 - 1/2 grown. Glabrous.  
C.B. 101, G. davidsonii, two plants. No green bolls.  
C.B. 763, G. stockii. Glabrous.

Interspecies Hybrids, American x American (F<sub>1</sub>)

- W 25, hirsutum x barbadense ? (Brown Mohaux 204A). Glabrous.  
W 46, barbadense x schottii, <sup>1/</sup> two plants. Bolls about 1/3 grown, glabrous.  
W 49, barbadense x schottii, <sup>1/</sup> two plants, boll on one nearly full grown, glabrous.  
W 26, contextum x hopi, plant 1. Glabrous.  
W 53, barbadense x punctatum, plant 1. Glabrous.  
W 50, hirsutum x barbadense, plant 1. Glabrous.  
W 51, contextum x schottii. Glabrous.

Related Genera

- C.B. 112, Thurberia thespesioides, two plants. Glabrous.  
C.B. 339, Thespesia lampas, two plants. Capsules densely pubescent with rather long hairs.

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<sup>1/</sup> The "schottii" parent of this combination was probably itself a hybrid.

BOLL PUBESCENCE, RIVERSIDE, SEPT. 6, 1934

Interspecies Hybrids, Asiatic x Asiatic F<sub>1</sub>

W 45, sanguineum x arboresum, three plants. Glabrous.

W 48, herbaceum x neglectum, three plants. Glabrous, most of the bolls nearly full-grown.

Interspecies Hybrids, American x Asiatic, F<sub>1</sub>

C.B. 646, two plants. Bolls 2-3 days old, glabrous.

Interspecies Hybrids, Wild Species X, F<sub>1</sub><sup>1/</sup>

W 34, hirsutum x armourianum, two plants. Glabrous.

W 43, hirsutum x armourianum, three plants. Glabrous.

W 56, contortum x armourianum, two plants. Glabrous.

W 56, barbadense (W5) x harknessii, one plant. Glabrous.

W 38, barbadense (Pima) x harknessii, two plants. Copiously pubescent with very short hairs, especially in sutures.<sup>2/</sup>

W 35, sturtii x harknessii, two plants. Apparently glabrous.

W 39, sturtii x harknessii, two plants. Apparently glabrous.

W 52, sturtii x harknessii, one plant. Apparently glabrous.

W 35, barbadense x sturtii, two plants. Glabrous.

W 57, barbadense x sturtii, two plants. Glabrous.

W 58, Thuberia thespesioides x G. sturtii, two plants. Glabrous.

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<sup>1/</sup> Very young bolls, probably none retained after they are about 3 days old.

<sup>2/</sup> Since the barbadense parent of W 38 was Sea Island (W 5) and the barbadense parent of W 38 was Pima (W 23 = PNB) it would appear that the latter carried a factor for boll pubescence not possessed by W 5, unless the harknessii parent, phenotypically glabrous, was heterozygous.

GOSYPIUM AND RELATED GENERA, PALM SPRINGS, CALIF.  
SEPTEMBER 3, 1932

Gossypium hartnessii. The difference between the Carmen Island form (# 861 and W 7) and the San Marcos Island form (# 862 and 867) is very striking here, as at Riverside. The former has ascending or nearly erect branches and much larger leaves, averaging about 3 times as large, with a distinct tendency to lobation, being very shallowly 3-lobed. Also the leaves are deeply cordate, with usually a closed sinus and are much lighter colored. In the San Marcos Island form (# 867) the branches are widely spreading and appear frondose, the bark is darker colored (red-brown) and the much smaller leaves are all entire, merely subcordate and darker green.

Erioxylum aridum The plant at the north end of row 4 had nearly 100 flowers this spring, according to Dr. Webber, but all were shed.

Gossypium sp. (# 694) Florida Keys. The plant is flowering freely. It has upland-like calyx and bracts, nearly white petals, a pronounced petal spot (grade 5 to 7) and yellow anthers (grade 5). The leaf is very similar to that of # 421 from Cape Sable, Florida, but is more pubescent, especially on the petiole and veins beneath. The bolls of # 694 are small, plump, ovoid, rather abruptly sharp-pointed and are 4-lock or 5-lock. Both # 421 and # 694 seem related to the Sonora-Sinaloa series (G. morrilli ?) as represented by # 396 etc. and belong clearly to the Mexican rather than to the South American group.

Gossypium jamaicense (# 670) This differs from the Florida plants (# 421 and 694) in being glabrous and having much less deeply-lobed leaves. There are only 3 well-developed lobes, the basal ones being merely coarse teeth or wanting altogether. The callus is very conspicuous, liver-colored.

Shantzia garckeana (# 649) The plant has a flower and 4 flower buds.

GOSYPIUM AND RELATED GENERA, RIVERSIDE, CALIF.  
SEPTEMBER 8, 1932.

X Gossypium harknessii from Carmen Island (#861 and W. 7) The young stems and petioles are very minutely stellate-puberulent, while in # 867 from San Marcos Island they are glabrous. The difference in branching habit is less apparent at Riverside than at Palm Springs. The two forms seem almost specifically distinct. <sup>1/</sup>

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X <sup>1/</sup> The type of G. harknessii at the University of California, from Santa Margarita Island, is like the Carmen Island form (# 861 and W 7) having relatively large and distinctly, though shallowly, 3-lobed leaves and minutely puberulent twigs and petioles.

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X Gossypium sp. (W 12) The second plant (at north end of row 3) is evidently a hybrid (Mexican x South American) having a pronounced petal spot (grade 5 or 6) and pointed bolls with pitted surface.

Gossypium sp. (# 644) from Florida, in row 8. A very hairy, upland-like plant. The plant of the same number in row 7 is similar except that the leaves are more deeply (usually 5-) lobed. The flower is upland-like except in having pale yellow petals, light yellow pollen and a faint petal spot.

Gossypium sp. (W 16) from Florida, in row 7. The 2 plants are alike and resemble # 644.

Gossypium sp. (# 421) from Cape Sable, Florida, in row 7. The first plant, which is very different from # 644, doubtless is the true # 421. The leaves are shallowly lobed, the basal lobes being scarcely more than coarse teeth, and the plant is glabrous except for a very few long hairs on the petioles and veins beneath. The second plant is quite different, having much more deeply lobed leaves and is conspicuously although rather sparsely villous on the petioles and young stems. Also the leaf blades are quite pubescent.

GOSYPIUM AND RELATED GENERA, RIVERSIDE, CALIF.  
SEPTEMBER 6, 1932.

*Gossypium* sp. (# 694) from Florida, in row 7. The first plant is much like the first (typical) plant of # 421 except in having more deeply lobed leaves. The second plant has much larger and much more deeply lobed leaves, although, like the first plant, it is very nearly glabrous. It looks much more like a South American cotton than the first plant.

*Gossypium jamaicense* (# 570) in row 7. The 2 plants seem identical and are glabrous or very nearly so, with very shallowly lobed leaves that are nearly flat, scarcely at all cupped. These plants closely resemble the first plant of # 421, from Florida, but have somewhat more shallowly lobed leaves.

X *Gossypium* sp. (# 784) in row 1. Although labelled *G. nanking*, these 2 plants show a marked resemblance to *G. neglectum* (# 785) in row 2, having very deeply and very narrowly lobed leaves.

*Gossypium davidsonii* (# 860) from La Paz, Lower California. The 2 plants differ from the 2 adjacent plants of #101 from Guaymas, Sonora, in being more conspicuously pubescent and in having larger, longer acuminate leaves with less tendency to lobation than in # 101.

Characters Distinguishing Old World from New World Cottons,  
as Given by Zaitzev or Observed by Kearney and Noted as Present  
in the C.B. Numbers Listed.

Pubescence 2-layered,

- A  
African sub-group, # 378, 419, 435, 436, 521, 729, 731  
Asiatic " " , # 422, 430, 519, 764, 772, 786, 817

Leaf lobe (terminal) narrowed at base

- African sub-group, # 378, 419, 435, 436, 729  
Asiatic " " , # 422, 619, 725, 727, 764

Pedicel declined

- African sub-group, # 378, 435, 436, 521, 729, 749  
Asiatic " # 393, 422, 430, 619, 620, 669, 725, 727, 754,  
764, 772, 783, 786, 817

Bracts strongly connate

- African sub-group, # 378, 435, 436, 521, 731, 743, 746, 749  
Asiatic " # 422, 430, 513, 618, 619, 620, 669, 725, 727,  
754, 764, 783

Bract teeth short \*

- African sub-group # 419, 435, 436, 731, 743, 746, 749  
Asiatic " # 422, 430, 513, 618, 620, 669, 725, 727, 754,  
764, 772, 783

Petal spot very large (relatively to petal size)\*

- African sub-group # 378, 419, 435, 436, 521, 731, 743, 749  
Asiatic " # 422, 430, 619, 620, 669, 725, 727, 754, 764,  
772, 783, 786

Pollen orange-colored\*

- African sub-group # 378, 419, 435, 436, 521, 731, 743, 746, 749  
Asiatic " # 422, 430, 618, 619, 620, 669, 725, 754, 764,  
772, 783, 786

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\* Character not mentioned by Zaitzev.

Characters Distinguishing African from Asiatic Subgroup  
of Old World Cottons as Given by Zaitzev or Observed by  
Kearney and Noted as Present in the C.B. Numbers Listed.

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- A. Leaf lobes relatively short, broad and rounded (African character)  
 African subgroup # 378, 419, 435, 436, 521, 729, 731  
 Asiatic " (exception) # 764
- A. Leaf lobes relatively long, narrow and pointed (Asiatic character)  
 African subgroup - none  
 Asiatic " # 422, 430, 618, 619, 620, 669, 725, 727, 754,  
 772, 783, 785, 817
- B. Leaf blade deeply cordate (African character)  
 African subgroup # 419 (sometimes) 731  
 Asiatic " (exception) # 725 (sometimes)
- B. Leaf blade shallowly or not cordate (Asiatic character)  
 African subgroup (exception) # 378, 419 (sometimes) 435, 436,  
 521, 729  
 Asiatic " # 422, 430, 618, 619, 620, 669, 725, 727, 754,  
 764, 772, 783, 785
- C. Leaf terminal lobe not toothed at base (African character)  
 African subgroup (probably in all numbers but not recorded)  
 Asiatic " (not recorded in any)
- C. Leaf terminal lobe toothed at base (Asiatic character)  
 African subgroup (not recorded in any)  
 Asiatic " # 430, 618, 620, 783
- D. Bracts moderately connate (African character)  
 African subgroup # 378 (sometimes) 419, 435 (sometimes)  
 Asiatic " (exception) # 619, 725 (sometimes) 772, 786  
 (sometimes)  
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Characters Distinguishing African from Asiatic Subgroup  
of Old World Cottons as Given by Zaitzev or Observed by  
Kearney and Noted as Present in the C.B. Numbers Listed.

D. Bracts strongly connate (Asiatic character)

African subgroup (exception) #376 (sometimes) 435 (sometimes)  
521, 731, 743, 749

Asiatic subgroup # 422, 430, 513, 618, 619 (sometimes) 620,  
669, 725 (sometimes) 727, 754, 764, 783, 817

E. Bolls smooth or nearly so (African character)

African subgroup # 378, 435, 436, 521, 742, 743, 746, 797

Asiatic subgroup - none

E. Bolls pitted (Asiatic character)

African subgroup - none

Asiatic " # 422, 430, 513, 618, 619, 620, 669, 725, 727,  
754, 772, 783, 786, 817

F. Boll short-ovoid or spheroidal, abruptly short pointed (African character)\*

African subgroup # 378, 381, 435, 436, 521, 742, 743, 746, 797

Asiatic " (exception) # 430, 513, 619, 754, 772, 786, 817

F. Boll ovoid, taper-pointed (Asiatic character)\*

African subgroup - none

Asiatic " # 393, 422, 618, 620, 669, 725, 727, 783

It appears that while none of our numbers representing the African  
subgroup have bolls of "Asiatic" shape, nearly as many of the Asiatic  
numbers have bolls of "African" shape as of "Asiatic" shape. Further  
study of the diagnostic value of this character is needed.

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\* Not noted by Zaitzev.