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November 18, 1931

C. B. NUMBERS OF GOSSYPIUM, ETC., ARRANGED BY SPECIES

(The names in most cases are those under which the seeds were received and cannot be guaranteed. A question mark after the C.B. number indicates that it is referred doubtfully to the species in question. Numbers not identified yet with any particular species are omitted)

Gossypium

africanum Watt (see obtusifolium)

anomalum Tod. ~~(see Cienfugosia)~~ # 1057

arboreum L. # 464, 513(?), 516, 540, 618, 620, 633

Armourianum # 862, 867 930
auritum Cook # 551, 552

barbadense L. # 331, 332, 451, 452, 468(?), 595(?), 682, 790

" ? (Egyptian) # 322-5, 361, 362, 363, 443-7, 483, 556, 683-6, 751, 758-762

brasiliense Macf. # 351(?), 455(?), 535, 594, 645, 666, 673, 692

brevilanatum Hochr. # 616

calycotum Cook # 550

cernuum Tod. # 422, 533, 614, 669, 688

contextum Cook # 542

Darwinii Watt (?) # 636, 637, 696-9, 702-4, 708, 709

Davidsonii Kellogg # 101, 859, 860

dicladum Cook # 544

evertum Cook # 548, 549

fruticulosum Tod.

gossypioides (Ulbr.) Standl. # 434

Harknessii Brandeg. # 861, 861A, ~~862, 867~~

herbaceum L. # 353(?), 381, 428, 429, 457, 460, 498, 521, 596, 657, 729, 731, 733-6, 739, 742-7, 792-8, 808, 814, 815(?)

hirsutum L. # 402, 416, 427, 450, 453, 456, 470, 471, 481, 482, 497, 499, 522, 574, 585, 598, 599, 606, 638-42, 659, 717, 723, 724, 726, 730, 732, 740, 741, 752, 753, 767, 771, 774, 777, 780, 799, 800-6, 811-3, 816, 818, 819, 820, 821, 840-2, 846-9, 854, 863

C. B. NUMBERS OF GOSSYPIUM, ETC., ARRANGED BY SPECIES.

Gossypium, cont'd.

Hopi Lewton # 716

indicum Lam. (see G. nanking)

intermedium Tod. # 619

jamaicense Macf. # 670, 687, (1037, 694(?)) 421(?)

Kirkii Mast. # 674, 689

Klotzschianum Anderss. # 700

lanceolatum Tod.

mexicanum Tod.(?)* # 396-415 (excl. 402 & 403)

microcarpum Tod.

Morrilli Cook # 334(?), 396(?), 543, 678(?)

mustelinum Miers

Nanking Meyen # 390, 391, 392, 393, 430, 473-8, 488-90, 502, 504(?), 517(?), 519, 520, 526, 572, 573, 575-584, 586, 588-590, 593(?), 600, 659, 725, 727, 754, 766, 768, 769, 772, 773, 775, 776, 778, 779, 783, 784, 809(?), 817(?) 824

neglectum Tod. # 506-511, 517(?), 518(?), 532, 554, 555, 621, 625, 627, 628, 630, 785, 786

obtusifolium Roxb. # 419, 431, 435, 436, 459, 465(?), 525, 529, 534, 538, 566, 605, 623, 626, 629, 631, 656, 658, 749, 764(?), 765(?)
those underlined are probably G. africanum Watt

Palmeri Watt.

patens Cook # 541

peruvianum Cav. # 467(?), 601, 613, 660-4, 2047 (Mohaux)

punctatum Sch. & Thon. # 432, 437, 602(?), 604, 755

purpurascens Poir. # 531, 671, 690, 844(?)

Raimondii Ulbr. #1223, 1224

Robinsoni F.v.M.

sanguineum Hassk. # 597, 622, 624, 787

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* Compare G. Morrilli Cook.

C. B. NUMBERS OF GOSSYPIUM, ETC., ARRANGED BY SPECIES.

Gossypium, cont'd.

Schottii Watt # 672, 691

Stocksii Mast. # 563, 652, 655, 668, 763, 1009

Sturtii F.v.M. # 564, 592, 612, 632, 833

taitense Parl.

tomentosum Nutt. # 527, 557

transvaalense Watt # 1068

tridens Cook # 547

vitifolium Cav. # 595(?)

Wightianum Tod.

Alyogyne

hakeaefolia (Giord.) Alef. # 524, 693, 756

Cienfugosia

heterophylla (Vent.) Garcke # 650

pentaphylla Schum. (G.anomalum Tod.) # 426, 539, 654

Erioxylum

aridum Rose & Standl. # 617

Julostylis

angustifolia Thev. # 565

C. B. NUMBERS OF GOSSYPIUM, ETC., ARRANGED BY SPECIES.

Kokia

Rockii Lewton # 558, 675, 677, 885

drynarioides Lewton # 676, 866

Montezuma

speciosissima Sessé & Moç. # 479

Shantzia

Garckeana Lewton # 647, 648, 649, 651

Thespesia

Lampas # 339

populnea Soland. # 423, 562

Thurberia

thespesioides Gray # 112, 926, 927

Additional characters of many of these species in hybrid book

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 soudanensis, 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 ~~veins~~ blades 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. Involucel 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.

erose, 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 involucel; 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-lock, (sometimes 3-lobed vertically between the carpels), very small, ovoid, abruptly short-pointed or nearly muticous, 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.

<u>Gossypium anomalum</u>

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

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

(C.B. 1051 was collected at Damergou, French West Africa, who sent the seeds under the name <u>G. africanum</u> Watt. Skovsted (Journ. Gen. 31: 288) concluded that, except in the narrow bractlets, "on all other morphological characters and on cytological and genetical grounds" (1937) this species is a Gossypium."

GOSSYPIUM ANOMALUM WAWRA & PEYRITSCH

(Sitzb. Akad. Wien, Math.-Naturh. Klasse 38: 561, 562. 1860)

Specimens are cited from Benguela (in cultivated fields), Nigeria, Senegal, Sennar and Kordofan.

Translation of the Latin descriptions: Shrub 5-10 feet high, branches and branchlets terete, scabrellous, densely covered with stellate hairs. Leaves alternate, 1-2 inches apart; petioles 12-37 mm. long, these and both surfaces of the blade covered with soft, fulvous, stellate tomentum; blades with a single gland (nectary) near the base of the midvein, beneath, palmately 5-parted (lower), 3-parted (upper), with usually obtuse or rounded sinuses, cordate, the sinus nearly closed or more or less open, lobes rounded, acutish, sometimes mucronulate, midlobe 25-37 mm. long, 4-10 mm. wide at base, 14-18 mm. wide below the middle, ovate-oblong, obtuse or rounded, lateral lobes 14-18 mm. long, 8-10 mm. wide near the middle, obliquely oval. Flowers racemosely arranged along the whole length of the branches, opposite the leaves. Pedicels 6-12 mm. long, scarcely thickened in fruit, 6-angular, tomentose, with 3 glands (nectaries) at apex. Bractlets of the involucel lance-linear, entire or few-dentate, obtuse, acute or acuminate, 8 mm. long, 2-3 mm. wide. Calyx campanulate, 15-striate, subtomentose with stellate hairs, tube scarcely 4 mm. long, teeth ovate, short-acuminate, 2 mm. long, 4 mm. wide at base. Petals obovate, inequilateral, almost subtriangular, 33 mm. long, 18-20 mm. wide at apex, black-punctate, villous at base, the free part pubescent externally, pale red, blackish at base. Staminal column

1/ Synonym: Cienfuegosia anomala Gürke. According to E. Ulbrich (in Bot. Jahrb. 50: 360. 1914) this would be a Cienfuegosia because of the narrow bractlets. anomalum

12-14 mm. long, filaments about 2 mm., anthers 0.5-0.7 mm. Style and clavate stigmas 20 mm. long. Capsule ovoid, acuminate, warty, 16-18 mm. long, 3-locular at apex, incompletely 6-locular below the middle, the septa disintegrating above. Seeds 3-4 in each locule, ovate, angulate, 6 mm. long, covered with brownish wool that is 4-6 mm. long when drawn out.

Nearest G. senarense Fenzl,[1/] but the latter is distinguished as follows: Petioles and leaf-blades downy with divergent, simple hairs, those of the petiole as long as its diameter; leaves less deeply lobed, segments acute or acutish and black-punctate, as is the calyx.

E. Ulbrich in letter to W. R. Maxon, May 7, 1936 (letter in THK's official file), referring to a specimen of C.B. 1051 sent him through Dr. Maxon, stated: "Die Pflanze stimmt mit unserem Material dieser Art gut überein, wenn auch bei dem afrikanischen Material die Blätter meist schmalere Abschnitte besitzen." Ulbrich maintained, however, that on the character of the involucre it is a Cienfugosia, not a Gossypium. Synonyms cited by Ulbrich are:

Cienfugosa anomala (Wawra et Peyr.) Gürke.
" pentaphylla K. Schum.
Gossypium microcarpum Welwitsch
" senarense Fenzl
" herbaceum var. Steudneri Schweinfurth (ined.?)

1/ This name is not given in Watt, Wild and Cultivated Cotton Plants of the World.

Gossypium anomalum

anomalum

Cienfugosia pentaphylla K. Schum., Bot. Jahrb. 10: 48. 1889.

Subshrub 1-1.5 m. high with slender virgate branches having a red bark and cinerous-tomentose at first, afterwards glabrate. Petiole 2-3 cm. long, tomentose. Blade 3-4 (1.5-5) cm. in diameter, suborbicular, cordate, 5-parted, the lobes oblong or ovate, acute, mucronulate, attenuate at base, tomentose on both surfaces and black-punctate beneath. Stipules subulate, 3-4 mm. long. Involucel of 3 bractlets, these oblong-lanceolate, acuminate, 1.5 cm. long, 3-4 mm. wide, pubescent externally. Calyx campanulate, about 1 cm. long, tomentose externally, 15-nerved, repandly 5-dentate, the teeth triangular, acuminate. Petals 4 cm. long, 2.5 cm. wide above, purple, the part exposed in bud stellately sub-tomentose. Capsule rounded-trigonous, 2.2 cm. long, 1.2 cm. in diameter, narrowed suddenly into an almost equally long, slender beak, glabrous, black-punctate.

Described from a collection in Herreroland. Compared by Schumann with C. Gerrardi Harv. and C. triphylla Harv. The name C. pentaphylla is not among the African species of Cienfugosia enumerated by Ulbrich (Bot. Jahrb. 50: 361. 1914).

anomalum

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. Pollen near xanthine-orange (Ridgway III). Stigmas short but well-exserted, or fairly long. Bolls 3-lock, small but finally surpassing the involucel, ovoid, sharp-pointed, sometimes with long

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, #133, 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 [1], 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, involucel, calyx, petals, column, exserted 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 1½ 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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[1] 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 sini 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 XII) 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 exserted 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, usually 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. ?).

Palm Springs, 1937. Corolla very open-campanulate; petals erose, rumpled only at apex; connective & anthers dark purple; pistil with nearly black oil-glands, these crowded toward apex so that the latter appears black, the exserted portion slender, more than the column.

Reprinted from JOURNAL OF THE WASHINGTON ACADEMY OF SCIENCES
Vol. 23, No. 12, December 15, 1933

BOTANY.—*A new* Gossypium *of Lower California.*[1]

THOMAS H. KEARNEY, Bureau of Plant Industry.

In 1931, as guests of Mr. Allison V. Armour, G. N. Collins, J. H. Kempton and the writer participated in a cruise in the Gulf of California. Seeds of *gossypium harknessii* Brandegee were collected on Carmen Island and, of what was supposed at the time to be a peculiar form of the same species, on San Marcos Island. Through the courtesy of Mr. and Mrs. E. H. Page, resident on the latter island, an abundant supply of seeds was received later. Plants were grown in California from these several lots of seed; and it became apparent, almost immediately, that the San Marcos Island plant is very different from typical *harknessii*, as represented by the Carmen Island collection.[2] Plants of both forms flowered and fruited at several stations in southern California in 1933. Comparison of these living plants, growing side by side, left no room for doubt that the plant of San Marcos Island is a quite distinct species. It has not, apparently, been described previously, although herbarium specimens were collected at the same locality by Ivan M. Johnston, as a member of the expedition of the California Academy of Sciences to the Gulf of California in 1921.

It is a pleasure to name this attractive little shrub in honor of Mr. Allison V. Armour, whose generous cooperation has enabled the Department of Agriculture to introduce valuable plants from many parts of the world, and who made it possible to obtain the evidence that the San Marcos Island plant is a new species of *Gossypium*.

Gossypium armourianum, sp. nov.

Frutex ramosissimus, ramis patulis vel adscendentibus, praeter corollam, capsulae partem interiorem, et semina mox glaberrimus; lamina folii crassa, nitida, 2–3.5 cm. longa et subaequilata vel latior, non lobata, subcordata, apice obtusa vel acutiuscula et saepe mucronata; pedunculus anthesi 2–4 cm. longus, subclavatus, sine nectariis; involucellum caducissimum, bracteolis 2–5 mm. longis distinctis subulatis integris; calyx 5-dentatus, dentibus 1–2 mm. longis, triangulis vel subulatis; petala 2.5–4.5 cm. longa, sulfurea, maculam conspicuam rubram ferentia vel nonnunquam immaculosa; filamenta 2–4 mm. longa, tenua; antherae ca. 1 mm. longae; styli et stigmata 20–25 mm. longa; ovarium 3–4-loculatum, loculis plerumque 3-ovulatis; capsula 10–20 mm. longa, ovoidea, abrupte acuminata vel interdum solum apiculata, intus margine valvarum glabra vel pilis raris longis debilibus ciliata; semina loculo quoque 1–3, 7–9 mm. longa, saepe solide connata, obovoidea, angulata, pilis appressis crispatis subfulvis dense pilosa.

[1] Received November 11, 1933.

[2] The difference was noticed, in the early seedling stage, by C. G. Marshall, Superintendent of the U. S. Acclimatization Garden, Torrey Pines, Calif.

Characters not stated in the preceding diagnosis are as follows: Shrub compact, broader than high, with the main stem or leading branch attaining a length of 115 cm. and a diameter at base of 2.5 cm., obscurely granular-puberulent on the very young parts, including the caducous stipules and involucel, dotted with slightly prominent, brown (drying black) oil glands on the twigs, stipules, petiole, midvein of leaf dorsally near base, peduncle, involucel, calyx, petals, column, exserted portion of pistil and capsule; twigs reddish and more or less glaucous, older bark reddish-brown; stipules 1.5 to 2.5 mm. long, subulate, soon deciduous; petiole slender, as long as or slightly longer than the blade, usually dark red toward apex; leaf blades dark green, with a very small greenish or brownish pulvinus, punctate with imbedded, dark brown oil glands, rounded-deltoid, often 1.5 times as wide as long, crenulate, the basal sinus open and broadly triangular, palmately 5-veined, with a small deltoid or lanceolate nectary near the base of the midvein, dorsally; flowers borne (usually singly and often as if terminally) on very short, spreading or ascending branchlets, to which the peduncle is articulated; involucel caducous long before anthesis, usually when the flower bud is not more than 6 mm. long; calyx 5–10 mm. high at anthesis, copiously dotted with oil glands; petals at apex about as wide as long, with upper margin slightly erose, often puberulent (and reddish) on the dorsal surface where exposed in bud, ciliolate above, ciliate towards base, densely so on the very short claws with hairs 1–2 mm. long, pale green-yellow,[3] the subbasal spot, when present, 5–10 mm. long, solid or striate, carmine; column staminiferous one-third to two-thirds of its length; stamens with pale orange anthers, the enlarged summit of the filament carmine, pollen orange-yellow; pistil with the exserted portion usually longer than the column and conspicuously dotted with reddish brown oil glands; stigmas erect, closely connate; capsule usually sharply acuminate with the point 1 to 5 mm. long, pale green before maturity, conspicuously dotted with oil glands much larger than those of the calyx; seeds rather narrowly obovoid, rounded-convex on the back, usually flat on the inner face or faces, coffee-colored, the hairs pale brown and attaining a length of about 4 mm.

TYPE LOCALITY: San Marcos Island, near the eastern coast of Lower California, latitude 27° 15′N. Type in the U. S. National Herbarium, no. 1,184,705, collected by T. H. Kearney, August 25, 1933, at Palm Springs, California, from a plant grown from seeds from San Marcos Island.

GEOGRAPHICAL DISTRIBUTION: Known only from the type locality.

SPECIMENS EXAMINED: San Marcos Island, *Johnston* 3645; *Collins, Kearney & Kempton* 251. Also living plants in the U. S. Department of Agriculture collections at Riverside, Palm Springs, and Bard, California, and Sacaton, Arizona, grown from seeds from San Marcos Island (F.P.I. 92903, 93543, 95656).[4]

This species is unique in having a very small involucel, that disappears long before anthesis. It is most nearly related to *G. harknessii* Brandegee, which differs from *G. armourianum* as follows: Stem or leading branch longer and thicker (attaining a length of 165 cm. and a diameter at base of 6.5 cm.); branches fewer, longer, less intricate, and more nearly erect; twigs

[3] RIDGWAY, ROBERT. *Color standards and color nomenclature*. Washington, 1912, Plate V.

[4] The corresponding C. B. (Cotton Breeding) numbers under which seeds were distributed by the Department of Agriculture are, 862, 867, 930.

less colored, these and the petioles densely stellate-puberulent; stipules longer (3 to 6 mm. long); leaf blades thinner, lighter green, not shiny, at least twice as large, distinctly 3-lobed, usually 7-veined from the base, deeply cordate at base with the sinus usually narrow and often closed above, acutish to short-acuminate at apex; peduncle much shorter (5 to 12 mm. long); involucel more persistent (usually until anthesis), the bractlets much larger (10 to 25 mm. long and 7 to 15 mm. wide), ovate or oblong-ovate, entire, denticulate or often rather deeply few-dentate toward apex; calyx merely undulate or denticulate on the margin and sparsely gland-dotted; capsule broader (often nearly spherical in shape), with inner margins of valves copiously long-ciliate; seeds plumper, the hairs longer, silvery-gray in color.[5]

Another interesting difference is in the oil of the walls of the unripe capsules. This is bright orange in both species, but has merely a peppery odor in *G. harknessii* (as in the cultivated Egyptian cottons), whereas in *G. armourianum* the oil is fragrant, with an odor suggesting that of rose geranium (*Pelargonium graveolens*).

G. armourianum is known only from San Marcos Island, where, as indicated on the labels of Johnston's specimens, it is "very common in draws, on talus and in sandy bottoms." When the writer saw the plants there on April 6, 1931, they were flowering profusely and had many unripe capsules, although there had been no heavy rainfall at that locality for more than 18 months. This species is, therefore, pronouncedly xerophytic like *G. harknessii*, which occurs in similar habitats.

The type collection of *G. harknessii* was made by T. S. Brandegee in 1889 on Santa Margarita Island, off the west coast of Lower California, at approximately latitude 24° 30′ N. This species has been collected also at several localities on the east coast of the peninsula and neighboring islands, from somewhat north to somewhat south of latitude 26°. Plants grown in California from seeds collected on Carmen Island by Collins, Kearney, and Kempton, are very similar to the type specimen in the herbarium of the University of California.

[5] As the two genera are defined by Bentham and Hooker (Genera Plantarum), by Schumann (Engler und Prantl. Natürl. Planzenfam.), and by Ulbrich (in Bot. Jahrb. 50 (Suppl.): 360, 1914), *armourianum* belongs to *Cienfugosia* rather than to *Gossypium*, because of its caducous involucel of small, narrow bractlets. But in *G. harknessii* the bractlets are much larger and less caducous and in *G. davidsonii* Kellogg they are both large and persistent. The three species are so evidently related to one another and are so like *Gossypium* in other characters that reference of any of them to *Cienfugosia* would be an unsatisfactory solution.

Gossypium brasiliense(?)

(Described from C.B. 351, 493, 528 and 673, 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-lock, 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 (?) (1935)

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 involucel; petals ruffled at apex, picric-yellow (Ridgway IV), 1/ fading pink, with very large and solid spots, these between pomegranate-purple and Bordeaux (Ridgway XII). Column elongate, staminiferous 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.

1/ 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. Involucel 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 exserted portion about 2/3 as long as the column. Bolls 4-lock, nearly spherical, muticous 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, 1/ 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

1/ 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 (±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 2½ 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-lock, 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. 2/

2/ 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 involucel. Bark of young branches usually reddish-brown, older bark light brown or grayish brown. Stipules much more persistent than in Armourianum, 6 to 13 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. Involucel 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.

laciniate 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 erose 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 (X) 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 exserted 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 locule. Capsule 15 to 25 mm. long and nearly as wide near the base, 4- to 6- (usually 5-) celled, broadly ovoid-conical, acutish 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 locule, 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.

Two plants of C.B. 860 from La Paz, L.C. and two plants of C.B. 101, originally from Guaymas, Sonora, were compared at Riverside Sept. 6, 1932. The former are more conspicuously pubescent, and have larger, longer-acuminate leaf-blades, with less tendency to lobation.

Herbarium specimens have been examined as follows: Guaymas, Sonora, Palmer 244 (C). San Pedro Bay, Sonora, Johnston 4321 (CA). Also the following from southern Lower California: La Paz, Jones 24209 (C, CA). Todos Santos, Jones 24138 (CA), 24139 (CA), 24207 (CA), 24210 (CA). San Jose del Cabo, Anthony (in?) 1897 (C), Brandegee 64 (C), and in 1899 (C), Grabendoerfer (in?) 1899 (C). Magdalena Bay, Mason 1936 (CA), 1937 (CA). Magdalena Island, Brandegee in 1889 (C). San Diego, (cultivated) K. Brandegee in 1906 (C).

A specimen from Todos Santos, L.C. (Jones 24210) is glabrous throughout but seems typical otherwise.

The type specimen was not located at Calif. Acad. Sci. (TH K)

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.

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; [2] 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,[3] 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

[2] 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.

[3] 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.

At Palm Springs, according to Arthur Gilman, G. Harknessii flowers mainly in the spring G. Armourianum off and on throughout the season (Sept. 1, 1938) This observation held good in 1941 (THK, Sept. 19)

Palm Springs, 1937 (compare G. Armourianum). Corolla very open-campanulate, about twice as large as in G. Armourianum much more pronouncedly ruffled and farther down the sides; pistil white with pale brown oil glands, the exserted portion longer than the column; stigmas closely coherent; stamens with white filaments and pale orange anthers, the connective without red color.

G. Harknessii

Gossypium Harknessii

T. S. Brandegee, Plants from Lower California.
Proc. Cal. Acad. Sci. ser.2, 2:136, 137. 1889.

Gossypium Harknessii. Shrubby, forming rounded clumps 2-3 feet high, with angled branches, glabrous throughout: leaves broadly cordate, often with closed sinus, entire or three lobed near the apex; petioles an inch or more long, equalling the blade: peduncles exceeding the petioles, jointed nearest the summit: bracts 3, broadly ovate-acuminate, entire, less than half the length of the sulphur-yellow petals: calyx truncate: petals an inch or more long, with purple spot at base: capsule ovate, pointed, 14 mm. long: carpels 3: seeds naked.

This handsome shrub belongs to the section to which the generic names Thurberia and Ingenhouzia have been given. The specimens were in flower and lacked mature fruit, but fortunately some old empty capsules were yet persistent. It was seen only upon Santa Margarita Island where it is very common, often growing in masses. Named for Dr. H. W. Harkness, President of the California Academy of Sciences, as a tribute to his efforts in furthering the exploration of Lower California.

The type specimen in the herbarium of the University of California, collected by T. S. Brandegee on Santa Margarita Island, March 1, 1889, has 3-celled, ovoid, abruptly and sharply acuminate bolls with points about 2 mm. long. It is very like the Carmen Island form (C.B. 8161) with ~~relatively longer~~ distinctly stouter, shallowly 3-lobed leaves and more pubescent twigs and petioles.

Other herbarium specimens examined were: Santa Margarita Island, Hanna & Slevin in 1922. (CA); Agua Grande, Carmen Island, Johnston 4144 (CA); Puerto Ballandra, Carmen Island, Johnston 3805 (CA); Loreto, Johnston 3189 (CA).

Gossypium Harknessii Brandeg. (and G. armourianum)

(I. M. Johnston in Proc. Cal. Acad. Sci. Ser. IV, 12: 1091)

"A flat-topped, loosely intricate shrub about 9 dm. high and 10-15 dm. broad. Common on rocky benches and particularly on gravelly washes. The bush has a clean glabrous and frequently glaucous foliage, and an abundance of bright yellow flowers. It is a very ornamental shrub and is much more handsome than G. Davidsonii. The corolla is lemon yellow with a maroon spot. .... On Carmen and San Marcos islands the plant is called 'algodon cimarron.' Away from the gulf shore of the peninsula the plant is known only from about the type locality on Santa Margarita Island."

Seen by Johnston on San Marcos, Coronados, Carmen and Monserrate Islands; and at San Nicolas Bay, Loreto and Escondido Bay.

According to E. A. Goldman (Contr. Nat. Herb. 16: 349) G. Harknessii is very abundant on basal slopes on Santa Margarita Island, forming dense patches 1.2 to 1.8 meters high.

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. Involucel 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 staminiferous 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 exserted portion none, or considerably exserted. Bolls 3- to 5-lock, small, but surpassing the involucel when mature, short-ovoid to nearly spherical, abruptly very short-pointed or almost muticous, 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. 1/

(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.

1/ 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 5, 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 staminiferous nearly to the base. Stamens rather numerous.

Gossypium intermedium, cont'd.

Pollen light-orange. Stigmas short, but well exserted. Bolls (not mature), 3-lock, 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(?) 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-lock, small, plump, ovoid, rather abruptly sharp-pointed or nearly muticous, the surface bright green, conspicuously pitted. Seeds completely covered with long, bright-brown fuzz. Lint very short and sparse, pale-brown. 1/

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, involucel 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). 1/ Involucel of soft texture persistent to maturity of the fruit; bractlets 3, separate, broadly ovate, cordate, deeply laciniate, 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-campanulate; 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 puberulent 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 exserted portion only about 1/3 as long as the column, puberulent, 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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1/ 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 involucel, 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, involucel and flowers) photographed by Harvey, in 1931.

This species is known only from the Galápagos archipelago, where, according to Robinson, 1/ Watt 2/ and Stewart, 3/ it occurs on the following islands: Albemarle, Bindloe, Charles, Chatham and Indefatigable. According to Watt it occupies "stony places in the lower sterile regions." The plant rather strikingly resembles G. davidsonii, but, as grown in California, it is taller and more tree-like, with a much better developed trunk. Owing to the petals being even more asymmetrical than in the other species here considered, and having longer claws, the corolla has a more strikingly "pin-wheel" appearance. The red color of the petal spot is in separate, parallel lines. The loose seeds fall very readily from the capsule when it opens. In this respect, in the stipitate seeds and in their looser, not crispate pubescence, G. klotzschianum shows more resemblance to G. thespesioides than to the other 3 species, but in shape the seeds are quite different from those of thespesioides.

Apparently no description of the fruit and seeds has been published previously.

1/ Robinson, B.L. Flora of the Galápagos Islands, Proc. Am. Acad. 38-77. 1902.

2/ Watt, George. Wild and cultivated cotton plants of the world. 1907, pp. 66, 67.

3/ Stewart, Alban. A botanical survey of the Galápagos Islands. Proc. Cal. Acad. Sci. ser. 4, 1 : 7-288. 1911, pp. 101, 102.

Compared with original

Gossypium klotzschianum Ands.

N. J. Andersson, Om Galápagos - Öarnes Vegetation. Vetensk. Akad. Handl. (1853) 228. 1855.

(Translation of Latin description)

Leaves rounded-cordate, acuminate (entire), short appressed-tomentose on both surfaces, 1-glandular beneath, petioles hairy, involucel laciniate, almost epunctate, with scattered stellate hairs, half as long as the corolla.

Inhabits rocky places in the sterile lower regions of Chatham and Charles Islands. - - - - -

Is distinguished with certainty from G. barbadense L. [as follows]: leaves undivided, broadly rotund-ovate, cordate at base, long-attenuate-acuminate at apex, soft stellate pubescent on both surfaces, entirely destitute of larger black dots, involucel shorter, with teeth narrower at base and not so long-setaceous-acuminate, very densely canescent with stellate hairs. - Shrub 12 feet high, much-branched, with spreading branches. Leaves wider below the middle and exactly rotund-cordate, $2\frac{1}{2}$ inches long, nearly 2 inches wide, canescent with stellate hairs. Flowers when open $1\frac{1}{2}$ inches wide, clear sulphur-yellow.

(Part of same description in Walpers Ann. Bot. Syst. 4: 309. 1857)

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. 1/ Pollen approximately baryta-yellow (Ridgway IV). Pistil (exserted portion) elongate. Bolls 3- or 4-lock, short, nearly spherical, abruptly and conspicuously sharp-pointed, occasionally with apical furrows, the surface smooth. Seeds fuzzless, or nearly so, stipitate.

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

Gossypium Morrilli (?), cont'd.

Lint very short, rather sparse, white.

Gossypium Nanking

(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), 1/ with solid spots occupying 1/4 to 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-

1/ 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 1/3 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.

C.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 3 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 exserted portion about 8 mm. long. Bolls 3- or 4-lock, 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.

G. neglectum albo-purpureum (Doc.)

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. Involucel (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 involucel; 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 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 laciniate 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 exserted 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. 672) also seems related to ~~G. Palmeri~~ C.B. 1145 but the herbage is strongly tinged with purple and is much more pubescent; also the leaf-lobes are broader and more laciniate 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 sp.

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

Apparently related to ~~G. Palmeri~~ C.B. #1145 but branches more spreading and leaves often reduced to 2 lobes or entire. Bracts much as in ~~G. Palmeri~~ C.B. 1145, deeply laciniate 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 patens

(Described from C.B. 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-acuminate, 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 3- 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.

G. peruvianum (1/37)

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. Involucel 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-lock, 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 purpurascens

(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).

G. purpurascens (cont.)

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.

G. Raimondii Ulbrich, Notizbl. Berlin Bot. Gard. 11: 548, 1932. See also J. B. Hutchinson, Emp. Cott. Gr. 16: 271 (in Libr. TAK) and H. B. Newcombe, Jour. Heredity 30: 530. 1939.

Under date of May 31, 1939, Mr. W. B. Wood, Bureau Plant Quarantine, wrote: "Gossypium mustelinum and G. taitense delinted in the usual way with sulphuric acid. G. Raimondii was given the same treatment using the same lot of H_2SO_4 but the lint was not removed. The acid wetted the lint but apparently did not char it so it could not be rubbed off. It would appear that there is a chemical or physical difference in the lint of this species as compared with others. The fiber is rather short and somewhat sparse."

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 pomegranate-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-lock, 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, 1/ 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.

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

Gossypium Stocksii. 1/

(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. Involucel green, sparsely puberulent; bractlets 20 to 23 mm. long, widely separated, clawed, deeply laciniate (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.

1/ The involucel 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 632, 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-gray. 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. Peduncles 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, staminiferous 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 exserted portion about 1/3 as long as the column; stigmas (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 staminiferous nearly its entire length. It is extremely subject to nematode attack, more so than any other Gossypium at Riverside.

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

J. M. Webber finds G. Sturtii more susceptible to nematode damage than any other Gossypium at Riverside and also that hybrids of which G. Sturtii is one parent are susceptible (Sept. 16, 1941)

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, involucel, calyx, petals, column and exserted 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, ciliolate 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. Involucel 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 erose, 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. 1/ 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. Pollen whitish, or cream-colored. Pistil about 18 mm. long above the ovary, the exserted 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. 2/

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

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

Gossypium Thurberi

The leaves are very different from those of the other 4 species considered in this paper, the larger ones being pedately parted. They greatly resemble in form those of G. schottii Watt and of the so-called "okra-leaf" variation in Upland cotton (G. hirsutum L.)

G. thespesioides resembles G. armourianum in the very narrow bractlets of the involucel, but is a more typical Gossypium than G. armourianum in having its involucel persistent to maturity of the fruit.

In his original description of Thurberia, Gray contrasted it, not with Gossypium but with Thespesia, distinguishing it from the latter by "its trimerous gynoecium and its dehiscent (3-valved) capsule, with the false dissepiments reduced to a mere fringe of delicate, wooly hairs; to which may be added the persistent involucel, the more complicate embryo" etc.

Benth. & Hook. Gen. Pl. 1: 198, in their key to the genera of Malvaceae, give only the following distinguishing character: Ovarium 3-loculare - Thurberia. Ovarium 5-loculare-Gossypium. In describing the genera (p. 209) it is stated that in Thurberia "Ovarium --- loculis pauciovulatis; stylus --- tricostato-stigmatosus;" and, in Gossypium, "Ovarium --- loculis oo-ovulatis; stylus --- 5 sulcatus et 5-stigmatosus."

K. Schumann in Engler u. Prantl 3: Abt. 6, 47. 1895, follows Benth. & Hook. closely, giving no additional characters. The name Ingenhouzia is adopted by Schumann for Thurberia and he describes it as having "large, heart-shaped bractlets," which does not apply to Thurberia.

In Gray & Robinson, Syn. Fl. 1: 297, also, the name Ingenhouzia is adopted and the following constrasting characters are given: Ingenhouzia, "involucel of 3 triangular-lanceolate, entire, herbaceous bractlets." Gossypium, "involucel of 3 ample and cordate, laciniate or dentate, foliaceous bractlets, distinct or united at base."

Thurberi

Gossypium Thurberi.

In describing Ingenhousia, De Candolle (Prodr. 1: 474) apparently mistook the involucel for a calyx, which he describes as "nudus 3-partitus, lobis ovato-lanceolatis acuminatis." If Ingenhouzia triloba DC. can be identified with Thurberia thespesioides Gray, the correct name under Gossypium would be G. trilobum (DC.), otherwise the name should be G. thespesioides (Gray). 4/ Ingenhouzia is based on a drawing by Moçino & Sessé, not reproduced in De Candolle's Dessins de la flore du Mexique. In the index of that work, a footnote, referring to planche 101, states:

"Ce genre, fondé sur la t. 101 des Icones florae mexicanae, a été reconnu par M. Asa Gray, à Genève en 1869, pour être son Thurberia, et l'espèce pour son Th. thespesioides, dont il a donné une excellente figure dans ses Plantae Thurberianae, t. 6. L'identité est si évidente qu' il a paru inutile de calquer le dessin."

De Candolle's description of Ingenhouzia in the Prodromus, as regards the form of the "calyx" (involucel) seems to correspond more closely to the plant identified by Standley as Gossypium gossypioides (Ulbrich) Standl. than to Thurberia. Standley describes the former as having the bractlets "ovate-cordate." 5/

The range of Thurberia thespesioides, as given by Standley (ibid p. 785) is southern Arizona to Chihuahua, Sonora and Jalisco.

A copy of the Mocino & Sessé plate of Ingenhougia triloba sent me by Prof. Hochreutiner differs from Thurberia in its much broader bractlets and subescent pedicels. It is probably a Gossypium, possibly G. gossypioides. See my letter to Hochreutiner, Jan. 31, 1934.

Gossypium lanceaefolme Miers probably same as G. trilobum (DC) Kearney. See my correspondence with Dr. B. Hutchinson, Aug. 9, 1939. Photostat of description of G. lanceaefolme filed with cotton literature, photostat copies.

4/ Gossypium thespesioides F. Muell. Fragm. IX:27 is based on Fugosia thespesioides Benth. Fl. Austral. 1: 220. 1863. Both of these names are antedated by Thurberia thespesioides Gray.

5/ Standley, P. C. Contr. U. S. Nat. Herb. 23: 783, 784. 1923. See also his letter to me, Nov. 14, 1933.

Thurberi

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 lobes, (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 exserted portion often as long as the column, with numerous, black oil-glands; stigmas (proper) very short, sometimes separate. Bolls 3- or 4-lock, 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.

G. tomentosum (1737)

Gossypium transvaalense

(Described from C.B. 1068, Riverside, 1935)

Very similar in vegetative characters to G. africanum. Bractlets somewhat connate, broadly ovate, deeply laciniate 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 exserted.

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

GOSSYPIUM 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 pulvinus, 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 two 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 short and broad.

Palm Springs Sept. 3, 1932 — 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 AND RELATIVES AT CALIFORNIA STATIONS, SEPTEMBER, 1930.

#675 Kokia Rockii. Riverside. (dead, 1931) 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.

#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.
Sept. 23, 1931 Pulvinus brown (not red).

#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.

GOSSYPIUM AND RELATIVES AT CALIFORNIA STATIONS.

#651 Shantzia garckeana (# 647 x 649 F_1) 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.

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 exserted portion of the style) nearly equalling the column, the stigmas much shorter than the style and united.

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)

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 involucel: 743 herbaceum (large); 393, 824 Nanking; 619 intermedium (large); 1081, W14 africanum (large); 422 cernuum (large); 1068 transvaalense (large); 620 arboreum (large); 1045, 1046 herbaceum x arboreum F_1 (Rao's Green Seed); W48 herbaceum x neglectum F_1 [1]; W125 (herbaceum x neglectum F_1) x herbaceum, F_1; W8 herbaceum x cernuum F_1; W45 sanguineum x africanum F_1 (large, functional); 646 American x Asiatic F_1 (large).

2. Calyx nectaries none or rudimentary, oil-glands extending to base of calyx: 785 neglectum [2]; 1051 anomalum; 564 Sturtii; 787 sanguineum; 763 Stocksii; W99 sanguineum x Stocksii F_1; W111 herbaceum x Sturtii F_1; W124 (sanguineum x africanum F_1) x sanguineum F_1; W79 Nanking x thespesioides F_1; W27 sanguineum x anomalum F_1.

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 (transverse slits); W28 barbadense x tomentosum F_1 (nectaries hairy); W80 hirsutum x tomentosum F_1 [3]; W24 hirsutum x cernuum F_1 [4].

1/ Nectaries large, pubescent, but perhaps non-functional.

2/ Observable and somewhat pubescent but bearing oil-glands and perhaps non-functional.

3/ Perhaps not functional.

4/ Small but sharply defined.

Nectaries

New World Species and Hybrids, Cont'd.

4. Calyx nectaries none: 1057, 1059, W24, W64 hirsutum; 527 tomentosum; 101 Davidsonii; 867 Armourianum; 112 ~~thespesioides~~ Thurberi; W41 Harknessii x Armourianum F_1; W58 ~~thespesioides~~ Thurberi x Sturtii F_1; W10 Davidsonii x Klotzschianum F_1; W9 Armourianum x ~~thespesioides~~ Thurberi F_1; W44 hirsutum x ~~thespesioides~~ Thurberi F_1.

Nectaries

Leaf Nectaries, Sacaton, October, 1930.

Gossypium hirsutum.

Acala (family 22). On midvein, near base, more or less elongated, triangular or narrowly elliptical, pointed towards apex of leaf, sometimes hardly more than a slit, as is usually the smaller one occasionally present on one of the principal lateral veins.

Lone Star (progeny 7-4-3-1-1). On midvein, near base, much as in Acala, sometimes prolonged downward as a slit on one or both sides, in the latter case giving the nectary the form of a slender arrow-head with its point towards the apex of the leaf, and a plug or strip of normal epidermal tissue between the lateral prolongations. A smaller nectary often present on one or both principal lateral veins.

King (families 67 and 82). Near base of midvein only, rounded triangular, rarely somewhat elongated.

Gossypium punctatum (?)

Hindi. Near base of midvein only, short-elliptical, more or less sharply pointed towards the apex of the leaf.

Gossypium Hopi

Hopi (and "Sacaton Aboriginal"). Near base of midvein, rounded-triangular or short-elliptical but somewhat narrowed near the obtuse apex, rarely prolonged downward into a lateral slit. A smaller one not rarely present on one or both of the principal lateral veins.

Leaf nectaries, cont'd

Gossypium barbadense.

Sea Island (in Cooperative Series). On midvein near base, prominent but smaller than in Pima Egyptian, nearly circular or rounded triangular, often extended downward on one or both sides as a narrow slit which is often less than a millimeter in bredth. A much smaller nectary often present on one of the principal lateral veins.

Pima Egyptian (family P H 8 and similar on bulk 5-3 ? in Cooperative Series). On midvein towards base very large and prominent, nearly circular or rounded-triangular with the point towards the apex of the leaf, usually (often greatly) prolonged downward on one or both sides, usually much more prolonged on one side than the other hence strongly asymmetrical, a strip or plug of normal epidermal tissue between the prolongations. A much smaller nectary often present near the base of one or both principal lateral veins.

Sakel Egyptian (family 25-17). On midvein as in Pima but the lateral prolongations usually shorter. A smaller nectary usually present on both of the principal lateral veins.

Yuma Egyptian (family 25-30). Nectaries as in Pima.

Zagora Egyptian (progeny 7-1-1). On midvein as in Pima but the upper portion usually more elongated and distinctly triangular, the downward prolongations often very long.

Gossypium barbadense x G. hirsutum.

Pima x Acala F_1. On midvein prominent, rounded-triangular or short elliptical, apparently never prolonged downward laterally. Smaller nectaries usually present on both of the principal lateral veins.

Leaf Pubescence, Sacaton, October, 1930.

Gossypium barbadense.

Pima Egyptian (family P H 8). Leaves rather sparsely stellate-pubescent on the lower surface with rather long hairs.

Sakel Egyptian (family 25-17). Leaves rather copiously stellate-pubescent on the lower surface.

Yuma Egyptian (family 30-25). Pubescence as in Sakel.

Zagora Egyptian. Pubescence of the lower surface even more copious than in Sakel and Yuma.

In Trans. Illinois Acad. Sci. 23: 169-173. 1931, Ethel H. Molby figures a trichome of Gossypium herbaceum L. (identity certain?) and describes it as follows: "The trichomes of Gossypium herbaceum L. are erect tufted groups of single hairs welded into a compound trichome (Figure 8). The branches are long and somewhat attenuated."

Pubescence

RIVERSIDE, APRIL 1, 1937

Hybrids of which F_2's will be grown this year.

W 29	hirsutum x tomentosum	10 plants
W 36	barbadense x Harknessii (also F_3 - 13 plants)	13 "
W 80	hirsutum (red Acala) x tomentosum	9 "
W 44	hirsutum x Thurberi	1 "
W 56	contextum x Armourianum	7 "
W 8	Armourianum x Thurberi	37 "
W 9	" x "	29 "
W 9 x	Thurberi (backcross)	14 "
W 8 x	Armourianum (")	4 "
W 9 x	" (")	1 "
W 95	purpurascens x tomentosum	7 "
W 21	hirsutum (red Acala) x cernuum	3 "
W 39	Sturtii x Harknessii	1 or 2 "
W 41	Harknessii x Armourianum	5 "
W 10	Davidsonii x Klotzschianum	5 "
W 28	barbadense x tomentosum	1 "
W 27	sanguineum x anomalum	12 "

F2 Hybrids, Riverside, 1937