

CONTRIBUTIONS TOWARD A REVISION OF *HECHTIA*
(BROMELIACEAE, PITCAIRNIOIDEAE)
II. NEW AND NOTEWORTHY *HECHTIA* SPECIES FROM OAXACA, MÉXICO

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ABSTRACT

Three new *Hechtia* species from Oaxaca, México are described, discussed, and illustrated: *H. complanata* Burt-Utley, *H. ixtlanensis* Burt-Utley, and *H. isthmusiana* Burt-Utley.

KEY WORDS. Bromeliaceae, *Hechtia*, México, Oaxaca

Hechtia, a genus of over 60 species, is widely distributed in México, ranging from the northern Mexican states that border the United States to the southernmost state of Chiapas where it borders Guatemala. Although widespread in México, this genus is most abundant in the state of Oaxaca, where at least 21 species are known, including the three described herein. Moreover, all but a few of these species are apparently endemic to Oaxaca and those that have slightly broader distributions occur in adjacent states. The greatest diversity of *Hechtia* in the state occurs in central Oaxaca near and north of the city of Oaxaca and south and southeast to the Isthmus of Tehuantepec. In this typically seasonally dry region with thorn-scrub vegetation and deciduous trees, but pine and oak at higher elevations, there are at least 11 species of *Hechtia* known, including the three species described herein.

1. HECHTIA IXTLANENSIS Burt-Utley, sp. nov. **TYPE. MÉXICO. Oaxaca.** 39.6 mi N of MEX 195 E of the city of Oaxaca along MEX 175 to Ixtlán de Juárez and Tuxtepec, 5600 ft, 28 Jul 1987, *J. Utley & K. Utley 7961* (holotype: MEXU; isotypes: B, C, CAS, GH, M, MICH, MO, NY, US, USF, XAL). Figures 1, 2, and 3.

Plants in flower with rosettes to 8 dm diam and inflorescences 1.5–2.7 dm high. Leaves very numerous, spreading to subspreading above the sheath, 39–64 cm long; sheaths hemiorbicular to broadly transversely elliptic, 5–8.5 cm long, 8–12 cm wide, the margins finely spinose and distally floccose, both surfaces glabrous and lustrous becoming densely lepidote distally to half their length, stramineous but oldest bases brunneous to castaneous distally; blades straight to subfalcate, narrowly triangular, 32–56 cm long and 2–3.5(–4.5) cm wide above the base, terminally spinose, the margins aggressively armed with antrorse to retrorse red-brown spines 1.5–4.5 cm apart and (1.5–)3–6(–8) mm long, above and below typically covered with appressed cinereous scales but occasionally appearing glabrescent. **Inflorescences** terminal, in staminate individuals twice compound or rarely once compound with (0–)5–9(–11) ascending secondary branches, but in pistillate individuals once or rarely twice compound with 0–2 secondary branches, both sexes usually with secondary branches in the lower half to third of primary branches, lepidote; scape similar and stout in both sexes, to 11.8 dm, and 2–3 cm diam at the base, lepidote; internodes short, 0.6–2.7 cm, lepidote; lowermost scape bracts foliaceous, 25–36 cm with short, triangular bases and long linear finely spinose and spinose tipped blades; mid- and upper scape bracts longer than the internodes, ovate-triangular with appressed linear-triangular blades but reflexed with age, 1.5–13.5(–21) cm; rachis 6.6–12.6 dm and 27–41 cm diam; primary bracts 1.5–9.5 cm long, longer than to shorter than the sterile bases of the branches;

primary branches of staminate inflorescences 16–25 cm long, lepidote, the sterile flattened bases (0.3–)1.5–7 cm, secondary branches 0.5–9.5 cm; but in pistillate inflorescences primary branches 6–22 cm long, the sterile flattened bases 0–2.5 cm, lepidote; secondary branches when present 3–6 cm long. **Staminate flowers** very numerous, spreading; floral bracts borne on sulcate ridges of branches, chartaceous, ovate-triangular to broadly ovate, convex, 1.2–3 X 0.8–1.8 mm, finely spinulose-serrulate, lepidote; pedicels articulated with the axis, conical, stout, 0.7–1.8 cm long, glabrous to sparingly lepidote; sepals 3-nerved, ovate-triangular to triangular, 1–1.6 X 0.8–1.8 mm, often conspicuously 3-nerved, cucullate distally, apiculate, marginally even to erose or very finely serrulate, glabrous to sparingly lepidote; petals ovate to elliptic, (2–) 2.5–3.2 X 1.5–2 mm, cucullate distally, apically rounded to praemorse, glabrous, cream-colored; rudimentary ovaries present. **Pistillate flowers** very numerous, sometimes in whorls, ascending; floral bracts borne on sulcate ridges of branches, chartaceous, flat to convex, ovate-triangular, 1.3–2.5 X 1–1.6 mm, proximally irregularly finely serrulate-spinulose, apiculate, glabrous to sparingly lepidote; pedicels stout, 0.5–1.5 mm long, glabrous to lepidote; sepals often conspicuously 1-nerved, ovate-triangular, 1–1.5 X 0.7–1.5, occasionally cucullate distally, apiculate, erose distally, glabrous to lepidote; petals triangular, (1.5–)2–3 X 1–1.5 mm, rounded to acute, glabrous, greenish yellow. **Capsules** with pedicels 1.5–2.8 mm long; bodies ovate-elliptic, 6.5–8 X 2.8–4 mm, smooth but sparingly finely ridged, greenish brown, glossy.

Distribution and habitat. *Hechtia ixtlanensis* is known only from central Oaxaca, where it has been collected in the Sierra Madre north of the city of Oaxaca at elevations between 5500 to 5600 ft on moist steep forested slopes with *Quercus*, *Pinus*, and low shrubs.

Hechtia ixtlanensis is a large species with rosettes to 8 dm and leaves to 64 cm long. Its leaves are densely lepidote but appear more conspicuous in some individuals than in others within the type population. *Hechtia ixtlanensis* shares a similar rosette and leaf form with *H. pringlei*, which is known from central Oaxaca near the city of Oaxaca. The species differ immediately in inflorescence characters as well as floral characters. Inflorescences of staminate individuals of *H. ixtlanensis* are twice compound like those of *H. pringlei*, but differ in their longer primary branches (16–25 cm vs 4–15 cm) and up to 11 secondary branches while staminate inflorescences of *H. pringlei* typically have two or rarely no secondary branches (pers. obs.). Similar differences are observed in the lengths of primary branches of pistillate inflorescences, with those of *H. ixtlanensis* generally longer than those of *H. pringlei* (6–22 cm vs 3–9.5 cm). There are also differences in flower color between these species, with petals of staminate flowers of *H. ixtlanensis* cream colored while those of *H. pringlei* are very pale yellow. Pistillate petals are greenish yellow in *H. ixtlanensis*, but are distinctly green in *H. pringlei*. The sexual dimorphisms observed in both *H. ixtlanensis* and *H. pringlei* are relatively common in *Hechtia* and have been observed in other species (Burt-Utley & Utley, 1993; 2011). Since the ovaries are partially inferior in both taxa and the length of the inferior portion cannot be accurately measured on dry specimens, sepal lengths were measured from sepal apices to the middle of their bases, while pedicel length was measured from the rachis of the lateral branches to the middle of the sepal bases.

Additional specimens examined. MÉXICO. Oaxaca. 5.8 mi E of Ixtlán de Juárez on new road to Xiacui and ca 34 mi N of city of Oaxaca, 4 Aug 1981, *Utley & Utley 6691* (CAS, GH, MEXU, MICH, US, USF).



Figure 1. *Hechtia ixatlanensis*. Isotype of leaves (from Utley & Utley 7961, USF).



Figure 2. *Hechtia ixtlanensis*. Isotype of part of staminate inflorescence (from *Utley & Utley 7961*, USF).



Figure 3. *Hechtia ixtilanensis*. Isotype of part of pistillate inflorescence (from *Utley & Utley 7961*, USF).

2. HECHTIA COMPLANATA Burt-Utley, sp. nov. **TYPE. MÉXICO. Oaxaca.** MEX 190 between Totolapan and Las Margaritas, ca 3.2 mi NW of Las Margaritas or 34.8 mi SE of turnoff to Mitla, 3500–3700 ft or 1100 m, 7 Aug 1992, *J. Utley & K. Utley* 8823 (holotype: MEXU; isotypes: BM, CAS, GH, MICH, MO, US, USF). Figures 4, 5, and 6.

Plants solitary, with rosettes 1–1.2 m diam and inflorescences to 2.3 dm high; new individuals developing in leaf axils of parent plant. Leaves numerous, subspreading to ascending, 51–79 cm long; sheaths on older leaves hemiorbicular to transversely elliptic, 6–7.5 cm long, 9.5–16 cm wide, marginally finely spinulose and distally floccose, both surfaces glabrous and lustrous becoming densely lepidote distally to a third their length, stramineous to castaneous, but older bases brunneous throughout above and below, but pale castaneous near their margins; blades straight to weakly falcate, narrowly triangular, (45–)51–74 cm long and 2.5–4.5 cm wide about 5–6 cm above the sheath, spinose tipped, the margins armed with antrorse and retrorse, or rarely straight, castaneous to dark brown spines 2.7–5.3 cm apart and (3–)4–7.5 mm long, above and below covered with appressed cinereous scales, but these most conspicuous on the lower third of the blade, blades becoming glabrescent with age, green occasionally flushing pink. **Inflorescences** terminal, in staminate individuals twice compound with 1–14 secondary branches and only rarely thrice compound with one or more secondary branches with very short branchlets, but in pistillate individuals once compound or infrequently twice compound with 1(–2) secondary branches, both sexes usually with secondary branches in the lower half to third of primary branches, lepidote to glabrous; scape in staminate individuals, to 76 + cm high, 1.2–3 cm diam, finely lepidote; in pistillate individuals to 118 X 2.2–3 cm, finely lepidote to glabrous; lowermost scape bracts foliaceous, ascending, 31–33 + cm long, spinose and spinose tipped; the remaining scape bracts ascending, becoming progressively reduced distally and exceeding the short, 0.4–5 cm long, usually minutely lepidote internodes, bracts basally triangular with linear, finely striate spinose and spinose tipped blades, lepidote; primary bracts of staminate inflorescences (1.2–)3–11.5 cm long, those of pistillate inflorescences (1.4–)3–5 cm long, spinulose and spinose tipped, lepidote, shorter than the lateral branches and shorter than to longer than the sterile bases of the branches; lateral branches complanate basally and sometimes throughout, appearing elliptic in cross-section, ascending, striate and sulcate, those of staminate inflorescences (8–)11.5–32 cm long, those of pistillate inflorescences (8.5–) 13–23.5 cm long, subsascending, both densely many-flowered, finely lepidote to apparently glabrous. **Staminate flowers** spreading, occasionally in verticils; floral bracts shorter than to equaling the sepals, chartaceous, flat to navicular, ovate to narrowly triangular, 0.9–2 X 0.3–0.8 mm, finely spinulose-serrulate, attenuate-acuminate, lepidote; pedicels articulated with the rachis, stout, conical, 0.3–1.5 mm long to the center of the base of the sepals, lepidote; sepals somewhat imbricate, subequal, chartaceous, convex and ovate to deltoid, 1.2–1.6 X 1–1.6 mm, cucullate distally, apiculate, occasionally finely serrulate-spinulose or erose especially distally, lepidote; petals spreading, ovate, drying spathulate to elliptic, 2.5–4.5 X 1.3–2.2 mm, apiculate, glabrous, pale yellow. **Pistillate flowers** subsascending, occasionally in verticils; floral bracts chartaceous, convex and triangular, 1–1.5 mm X 0.4–0.7 mm, apiculate, finely serrulate-spinulose, lepidote to occasionally glabrous; pedicels articulated with the rachis, stout, conical, 0.5–1 mm long to the center of the base of the sepals, lepidote to occasionally glabrous; sepals convex, triangular, 0.8–1.2 X 0.8–1.2 mm, to the center of the base of the sepals, praemorse, entire to irregularly finely serrulate, lepidote to occasionally glabrous; petals triangular, 2.1–2.9 X 1–1.8 mm, apiculate to acute, glabrous, green; ovaries lepidote. **Capsules** with stout conical pedicels 1.5–2 mm long; bodies loculicidally and septocidally dehiscent, cylindric to narrowly elliptic, 7.5–8.5 X 3–4 mm, finely lepidote, when immature dark brown but drying olive green.



Figure 4. *Hechtia complanata*. Isotype of leaves (from J. Utley & K. Utley 8823, USF).



Figure 5. *Hechtia complanata*. Isotype of part of staminate inflorescence (from J. Utley & K. Utley 8823, USF).



Figure 6. *Hechtia complanata*. Isotype of part of pistillate inflorescence (from J. Utley & K. Utley 8823, USF).

Etymology. The specific epithet *complanata* refers to the horizontally flattened or subflattened branches of *Hechtia complanata* on the type series. Although it is not uncommon to find species with flat sterile bases of branches, the vast majority of species examined have most of the fertile part of their branches rounded.

Distribution and habitat. *Hechtia complanata* is known only from central Oaxaca, where it grows on cutover slopes with low deciduous forests and thorn-scrub vegetation between 3500 and 4000 ft.

Discussion. *Hechtia complanata* is a robust, aggressively spinose species that stands apart from most other *Hechtia* species in its inflorescence branches that are often horizontally complanate for much of their length and in its staminate individuals with frequently very numerous secondary branches. Within the type series, most inflorescences were lepidote, but at least one lacked significant pubescence. *Hechtia complanata* is distinct from other *Hechtia* species with terminal inflorescence in its sparingly lepidote ovaries, since lepidote ovaries have only been consistently observed in species with lateral inflorescences, including *H. glomerata* Zucc. and *H. texensis* S. Watson.

As in many other *Hechtia* species, staminate flowers of *H. complanata* are small, with staminate sepals only 1.2–1.6 X 1–1.6 mm and pistillate sepals 0.8–1.2 X 0.8–1.2 mm. It should be noted that sepal lengths were measured from the sepal apices to the middle of their bases, while pedicel length was measured from the rachis of the lateral branches to the middle of the sepal bases to standardize measurements. *Hechtia complanata* is similar to *H. ixtlanensis* in its articulated pedicels, twice compound staminate inflorescences with numerous secondary branches and shorter staminate pedicels, but it differs from *H. ixtlanensis* in its often larger leaves [(45–)51–74 cm vs 32–56 cm] and pale yellow staminate petals and green pistillate petals. From *H. pringlei*, the staminate inflorescences of *H. complanata* are immediately distinguished by their longer primary branches [(8–)11.5–32 cm vs. 4.3–15 cm] with numerous secondary branches [1–14 vs. 0 or 2].

Additional specimens examined. MÉXICO. Oaxaca. Ca. 60.4 mi NW of Río Hondo on MEX 190 to Oaxaca, 4000 ft, 1 Jan 1987, *J. Utley & K. Utley* 7691 (MEXU, US, USF).

3. HECHTIA ISTHMUSIANA Burt-Utley, sp. nov. TYPE. MÉXICO. Oaxaca. 12.4 km N of La Ventosa junction on MEX 185 (Transisthmian Hwy), 800 ft, 24 May 1990, *J. Utley & K. Utley* 8491 (holotype, MEXU; isotypes, CAS, GH, MO, NY, US, USF, XAL). Figures 7 and 8.

Plants caulescent to 0.6–1 m with rosettes 2.5–5 dm diam and inflorescences 3.5–9.4 dm high. Leaves several to many, spreading to strongly reflexed, 14–36 cm long; sheaths on oldest leaves often completely encircling the plant base, 2–4 X (2.8–)4–8 cm, marginally finely spinulose and floccose, both surfaces glabrous and lustrous becoming lepidote distally, pale to dark castaneous; blades straight to subfalcate, narrowly triangular, 1.5–2.4 cm wide about 3 cm above the sheath, spinose tipped, marginally armed with generally antrorse spines (0.6–)0.8–1.8 cm apart and (0.5–)1.8–2.5 mm long, above and below covered with appressed cinereous trichomes, bright green to pale dusty rose. Inflorescences terminal, similar in both staminate and pistillate individuals, ellipsoid, typically once compound; scape (17–)23–38(–46) cm, 0.4–1 cm diam, glabrous; internodes (0.7–)1.5–4.5(–7) cm; lowermost scape bracts foliaceous, (9–)11–22 cm, exceeding the internodes or rarely shorter than the internodes; internodes (0.5–) 1.5–4 cm; mid- and upper scape bracts exceeding the internodes, reflexed with age above the sheath, the blades very narrowly triangular to linear (1–)3–10 cm, apically spinose tipped, lepidote; primary bracts 0.8–5 cm; in staminate individuals the rachis 17–55 cm and 4.5–12 cm diam midway up the rachis; lateral branches subascending, straight or

becoming arcuate distally, weakly sulcate, subdensely flowered throughout, (1.8–) 2.5–7.5 cm; in pistillate individuals at or post-anthesis, the rachis 25–61 cm and (1.5–)4.5–7 cm diam midway up the rachis, glabrous throughout; lateral branches subascending, straight or becoming arcuate distally, subdensely to densely flowered, (0.1–)1.5–3.5(–4.5) cm, glabrous. **Staminate flowers** spreading to subascending; floral bracts chartaceous, navicular, ovate to oblong, 2–3.5(–5) X 1–2.5(–3) mm, apically attenuate-acuminate to apiculate, marginally finely denticulate to serrulate or erose distally, glabrous; pedicels weakly articulated with the rachis, conical, 1.2–3.5 mm long to the center of the base of the sepals, glabrous; sepals subequal, basally overlapping, flat to navicular, ovate to ovate-triangular, 1.5–2.7 X 1–1.8 mm, apically praemorse, marginally hyaline, glabrous; petals spreading, elliptic to ovate-elliptic, 3.5–4.5 X 1.9–3.3 mm, glabrous, cream-colored but often tipped rose. **Pistillate flowers** secund to ascending; floral bracts chartaceous, flat, ovate-triangular to oblong, 2–3.5 X 1.2–2 mm, apically apiculate to acuminate, marginally erose to very finely serrulate-denticulate, hyaline, glabrous; pedicels articulated with the rachis, 1.5–2.5 cm to the center of the base of the sepals, glabrous; sepals chartaceous, triangular, 1.8–2.5 X 1.2–1.5 mm, apically acuminate to apiculate, praemorse, glabrous, cream-colored; petals spreading at anthesis, triangular, 4–5 X 1.5–2.5 mm, marginally hyaline, glabrous, cream-colored but often tipped rose. **Capsules** with pedicels 2–4.5 mm; loculicidally and septicidally dehiscent, narrowly ovoid, (6–)7.5–11 X 3–4.5 mm, dark castaneous.

Distribution and habitat. *Hechtia isthmusiana* is known only from the vicinity of the Isthmus of Tehuantepec where it grows terrestrially or epilithically on low rocky hillsides in full sun on boulders or areas shaded with thorn-scrub vegetation and tropical deciduous forests including *Plumeria* and *Bursera* at elevations between 200–600 ft.

Discussion. *Hechtia isthmusiana* is a species with relatively small rosettes that stands apart from most other *Hechtia* species in its long, caulescent, leafy stems. In growth habit, *H. isthmusiana* is most similar to *H. mooreana* L.B. Sm. from Guerrero but differs in many other characters, including its significantly larger flowers and capsules (pers. obs.). *Hechtia isthmusiana* appears most similar to *H. caudata*, which also occurs in southeastern Oaxaca. Both species have relatively large staminate and pistillate flowers and similar pedicel lengths, with those of pistillate flowers of *H. isthmusiana* 1.5–2.5 mm, while those of *H. caudata* range from 2–3 mm. Pistillate sepals of both species are similar in length, but those of *H. caudata* are slightly broader (1.2–1.5 mm vs 2–2.5 mm). Pistillate petal size is virtually the same in both taxa, 4–5 mm. Capsules of both species are ovoid and have similar lengths [*H. isthmusiana*: (6–)7.5–11 mm vs *H. caudata*: 6.5–12.3 mm], but those of *H. isthmusiana* are slightly narrower than those of *H. caudata* (3–4.5 mm vs 4.5–5.5 mm). Staminate flower measurements are similar in both species, but the species do differ in vegetative and certain inflorescence characters.

With respect to vegetative characters, caulescence has only been observed in *Hechtia isthmusiana*. Moreover, rosettes of *H. isthmusiana* are smaller than those of *H. caudata* (2.5–5 dm vs 5–8 dm), and their leaves are much shorter than the those of *H. caudata* [14–36 cm vs (39–)45–77 cm] and their blades are narrowly triangular (1.5–2.4 cm wide) and have shorter spines and are less aggressively spinose than those of the broader triangular blades (3.8–8 cm wide) of *H. caudata* [spines (0.5–)1.8–2.5 mm vs 2.5–4 mm long].

The flowering rachises of *Hechtia isthmusiana* are generally shorter than those of *H. caudata* (♂: 17–55 cm vs 80–93 cm; ♀: 25–61 cm vs 47–75 cm). Both staminate and pistillate inflorescences of *H. isthmusiana* are once compound, but those of staminate inflorescences of *H. caudata* are once to occasionally twice compound. When lateral branches of both species are compared, those of both staminate and pistillate inflorescences of *H. isthmusiana* are only slightly shorter those of *H. caudata*



Figure 7. *Hechtia isthmusiana*. Isotype of staminate plant (from *Utley & Utley 8491*, USF).



Figure 8. *Hechtia isthmusiana*. Isotype of pistillate plant (from Utley & Utley 8491, USF).

[♂:(1.8–)2.5–7.5 cm vs (3.5–)6–15.5 cm; ♀: (0.1–)1.5–3.5(–4.5) cm vs (2.3–)4–12 cm]. It should be noted that Smith (1961, 1974) characterized the inflorescences of *H. caudata* as lateral, but they are terminal like those of *H. isthmusiana* and most other *Hechtia* species.

Additional specimens examined. MÉXICO. Oaxaca. Isthmus of Tehuantepec 6.6 mi N of La Ventosa along MEX 185, Transisthmean Hwy, 600 ft, 29 Dec. 1988 (MEXU, USF); *Utley & Utley* 8327; along MEX 185 ca 6.5 mi N of La Ventosa, 600 ft, 19 Jul 1989, *Utley & Utley* 8404 (MEXU, USF); ca 4.1 mi E of La Ventosa on MEX 190, 200–300 ft, 18 Jul 1989, *Utley & Utley* 8403 (MEXU, USF, USF); 6.5 km E of La Ventosa on MEX 190, 300 ft, 24 May 1990, *Utley & Utley* 8493 (MEXU, USF).

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