

## NOVELTIES IN MESOAMERICAN *KEFERSTEINIA* (ORCHIDACEAE: ZYGOPETALINAE)

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**Abstract.** Three new species of *Kefersteinia* from Guatemala and Panama are described and illustrated. *Kefersteinia alata* is closely related to *K. costaricensis* but differs in the larger size of the plant, the narrow, elliptic sepals, the erect petals incurved along the column, the rounded apex of the lip, and the distinctly longer tooth under the column. Among the species of sect. *Umbonatae*, *K. angustifolia* may be recognized by its very narrow linear leaves, the proportionately small petals, and the peculiar spatulate-flabellate lip. *Kefersteinia tinschertiana* is a member of sect. *Kefersteinia*, differing from other species of the *K. lactea* group in the deeply bilobed apex of lip, the high laminar callus, and the peculiar ornamentation of the column. *Kefersteinia elegans* is first recorded and illustrated for the flora of Panama. A key is provided for the species of *Kefersteinia* in Mesoamerica.

**Keywords:** Orchidaceae, Zygopetalinae, taxonomy, *Kefersteinia*, *Kefersteinia alata*, *Kefersteinia angustifolia*, *Kefersteinia elegans*, *Kefersteinia tinschertiana*, Costa Rica, Guatemala, Panama.

Within the complex of genera allied to *Chondrorhyncha* Lindl. (Orchidaceae: Zygopetalinae), *Kefersteinia* Rchb.f. represents a natural group mostly defined by small and resupinate flowers, a lip with a basal, usually bilobed callus, and a column with a narrow, transverse stigma, generally provided with a ventral laminar plate and a central keel, sometimes extending to the rear into a distinct tooth. Preliminary data based on DNA sequences (Dressler, 2000; Whitten et al., in prep.) confirm *Kefersteinia* as a distinct clade sister to *Ackermania* Dodson (including *Chondrorhyncha reichenbachiana* Schltr.), *Stenia* Lindl. (most likely including *Dodsonia* Ackerman), and other Central American taxa included under a broad concept of *Chondrorhyncha*, in need of generic recognition (Dressler, 2000). Although eminently Andean in distribution, *Kefersteinia* ranges through the Mesoamerican isthmus north to the states of Guerrero and Oaxaca in Mexico (Espejo Serna and López-Ferrari, 1997). As a result of increasing botanical exploration in Mesoamerica, new *Kefersteinia* species from the region were described in the last two decades (Dressler, 1983; Dressler and Mora-Retana, 1993; Gerlach, 1995; Pupulin, 2000).

During the studies toward a revision of *Kefersteinia* in Costa Rica (Pupulin, 2001), the author had the opportunity to critically review living and pickled material of the genus from other countries in Mesoamerica. In view of the systematic revision of the Orchidaceae intended for the *Flora Mesoamericana* (Dressler and collaborators, in prep.), the present paper will describe three new species from the area and will extend to Central America the range of *K. elegans* Garay, previously thought to be endemic to the Andes of Colombia.

***Kefersteinia alata*** Pupulin *sp. nov.* TYPE: PANAMA. Bocas del Toro: road from David to Chiriquí Grande, around km. 74, ca. 450 m, epiphytic in premontane moist forest, 10 April 2001, flowered in cultivation at Gaia Botanical Garden, 18 August 2001, *F. Pupulin, D. Castelfranco & E. Salas 3119* (Holotype, USJ; Isotypes: USJ-Spirit). Fig. 1, 2A–B.

*Species Kefersteiniae costaricensis* Schltr. *similis, planta omnine majore, sepalis anguste ellipticis, petalis incurvatis, ventri columnae dente magno ornato dignoscenda.*

**Plant** epiphytic, erect, caespitose, to 22 cm tall, each shoot provided with 3–4 leaves and 2–3 basal cataphylls, foliaceous or not. **Roots**

I am especially grateful to Dario Castelfranco for supporting field trips and the facilities provided through Gaia Botanical Garden and to Robert L. Dressler for useful discussions on Mesoamerican Zygopetalinae. I also thank Margaret A. Dix and Michael W. Dix for providing material and information about species of Zygopetalinae in Guatemala, and Karen Lind and her family for sharing information on orchid species living on their properties. Otto Tinschert freely provided plants from his collection for this study.

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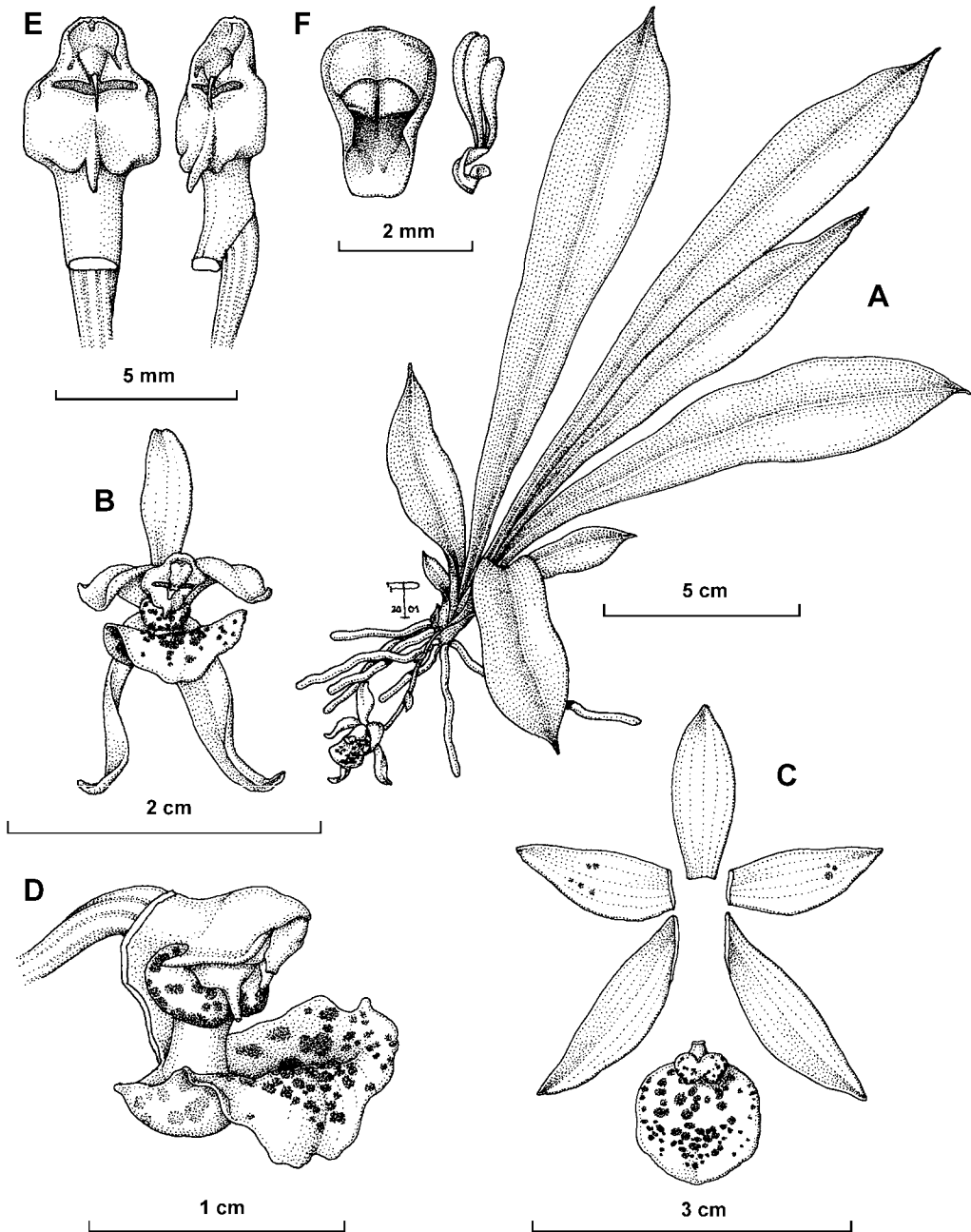


FIGURE 1. *Kefersteinia alata* Pupulin. A, habit; B, flower; C, perianth parts dissected; D, column and lip (lateral view); E, column (ventral and three-quarters views); F, anther cap and pollinarium. Drawn from the holotype.

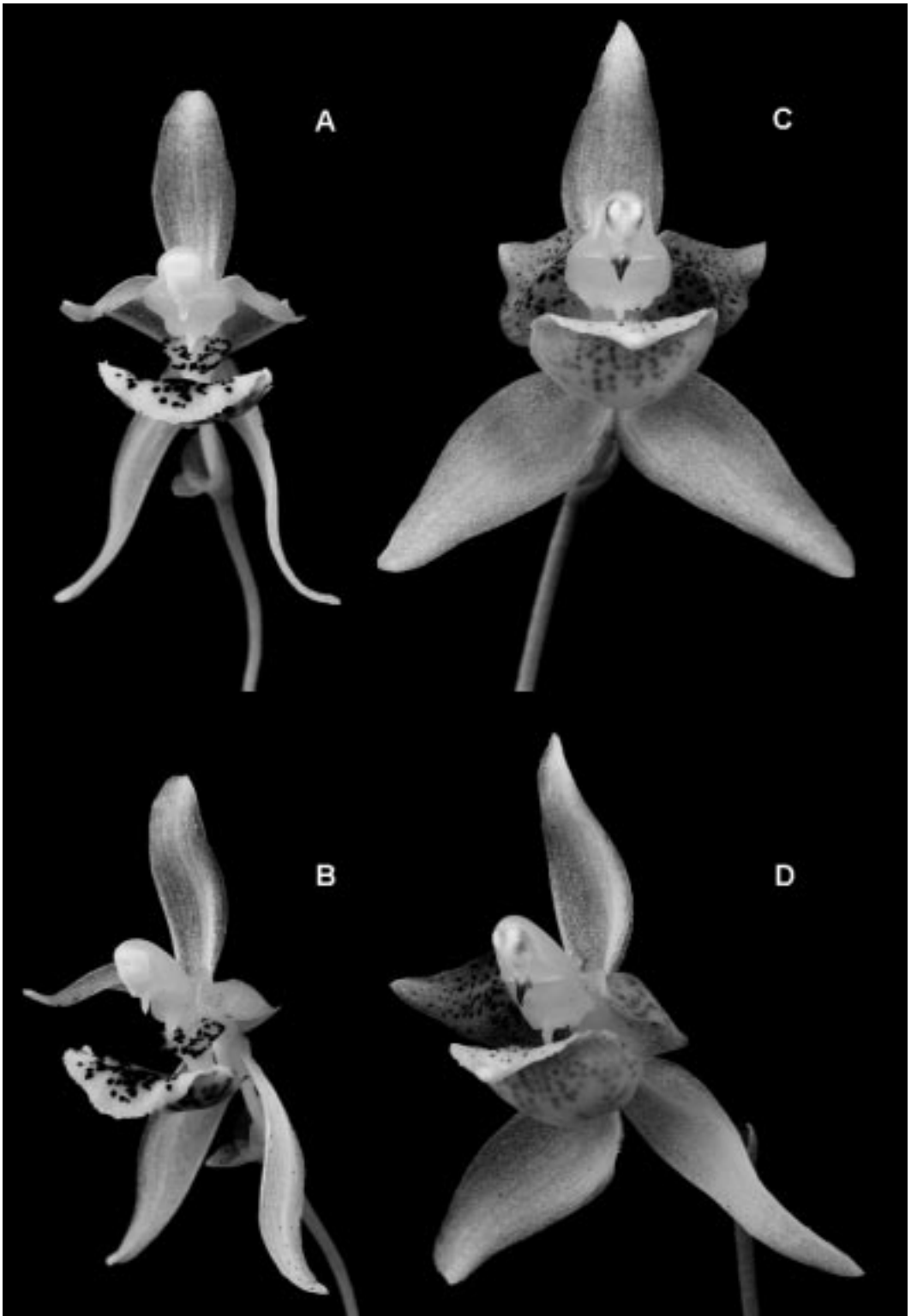


FIGURE 2. Comparison between *K. alata* (A–B) and *K. costaricensis* (C–D). A and C, flowers in frontal view. B and D, flowers in three-quarters view. A–B based on *Pupulin et al.* 3115; C–D based on the following voucher: Costa Rica. Puntarenas: Coto Brus, vicinity of San Vito, *W. Chacón s.n.* (USJ-Spirit).

rather coarse, flexuous, glabrous. **Leaves** oblong, acuminate, 7.3–20.0 cm long, 1.6–2.8 cm wide, narrowing at the base into a conduplicate petiole to 1.5 cm long. **Inflorescences** 1–2, each with a slender, pendent, solitary flower; peduncle terete, slender, to 3.5 cm long, with 2–3 conic-infundibuliform, membranous bracts. **Floral bracts** widely ovate, acute, 5 mm long, about 4 mm wide. **Ovary** subclavate, terete, 10 mm long including the pedicel. **Flowers** small, spreading, the sepals pure white, the petals white with few purple spots, the lip white spotted and blotched with dark purple, the callus white spotted purple. **Dorsal sepal** elliptic, acute, 16 mm long, 6 mm wide. **Lateral sepals** obliquely narrowly elliptic, acute, concave toward the apex, inserted on the column foot, 21 mm long, 6 mm wide. **Petals** lanceolate-elliptic, acute, incurved over the column, 16 mm long, 6 mm wide. **Lip** with a short cuneate claw, suborbicular, obtuse, concave at the base, the distal portion of the lamina recurved at middle, 13 mm long, 11 mm wide; callus basal, erect, pedicellate, bilobed, cordiform, the apex with a rhombic notch, 3 mm high, 5 mm wide, 3 mm long. **Column** elongate, with a prominent foot, 7 mm long, 4 mm wide at the middle, from a narrow base, the ventral surface forming a transversely rectangular plate, basally protruding into two short, rounded teeth, provided with a low median keel at the base of the stigma, projecting in the rear into a long, acute tooth. **Anther cap** cucullate, obovate, compressed, rounded at apex, truncate at the base, 2-celled. **Pollinia** 4, linear-oblong, laterally slightly sigmoid, on a large, infolded stipe; viscidium hyaline, ovate.

**Distribution:** Known only from Panama.

**Paratypes:** Panama. Same locality of the type, 10 April 2001, *F. Pupulin*, *D. Castelfranco* & *E. Salas 3116* (USJ-Spirit) and *3120* (USJ-Spirit). Chiriquí: La Fortuna area, road between Gualaca and Chiriquí Grande, km 42, 1130 m, epiphytic in shade along a small creek, lower montane moist forest, secondary vegetation, 10 April 2001, *F. Pupulin*, *D. Castelfranco* & *E. Salas 3115* (USJ-Spirit).

**Ecology and phenology:** Epiphytic in pre-montane and lower montane moist forest along the eastern and Caribbean slopes of Volcán Barú, at 450–1150 m elevation. Flowering occurs from June to September.

**Etymology:** From the Latin *alatus*, “winged,” in reference to the position of the petals, like

the wings of a bird taking flight.

*Kefersteinia alata* is closely related to *K. costaricensis* Schltr. but differs in the larger size of the plant, the narrow, elliptic sepals, the erect petals incurved along the column, the rounded apex of lip, and the distinctly longer tooth under the column (Fig. 2). Moreover, the petals and sepals of *K. costaricensis* are greenish white to pale yellow with the petals always densely spotted with purple, whereas *K. alata* has white petals and sepals, and the petals sometimes have a few scattered purple spots. In his treatment of *Chondrorhyncha costaricensis* for the Flora of Panama, Allen (1949) pointed out the more prominent apicule on the plate below the stigma in Panamanian material, as well as the subrhombic rather than scutellate divisions of the callus apex. Both *K. alata* and *K. costaricensis* are found in Panama, the latter species being illustrated in Fowlie (1966) (*H. Butcher* & *J.A. Fowlie F64P6*, photo!).

*Kefersteinia angustifolia* Pupulin & Dressler *sp. nov.* TYPE: PANAMA. Chiriquí: Laguna, near el Hato del Volcán, 21 October 1967, *H. Butcher s.n.* (Holotype: MO). Fig. 3.

*Inter species Sectionis Umbonatarum foliis anguste linearis attenuatis, petalis parvis, labello spatulato-flabellato, lamina in pagina ventrali columnae marginibus laceratis ornata dignoscenda.*

**Plant** epiphytic, erect, caespitose, to 19 cm tall, each shoot provided with 4–6 leaves and 2–3 basal cataphylls, foliaceous or not. **Roots** slender, flexuous, glabrous. **Leaves** narrowly linear, attenuate, 7.1–18.6 cm long, 0.5–0.7 cm wide, narrowing at the base into a conduplicate petiole to 2.5 cm long. **Inflorescences** 1–2, each a slender, pendent, solitary flower; peduncle terete, slender, to 4 cm long, with 2–3 conic-infundibuliform, membranous bracts. **Floral bracts** double, the outer one widely ovate, obtuse, 4.5 mm long, about 5 mm wide, the inner one ovate, acute, smaller. **Ovary** subclavate, slightly winged, 7 mm long including the pedicel. **Flowers** small, the tepals not spreading out completely, pale green, spotted with rose-purple, the lip with large blotches within. **Dorsal sepal** elliptic, acute, minutely apiculate, concave, 9 mm long, 4 mm wide. **Lateral sepals** elliptic-lanceolate, falcate, acute, minutely apiculate, deeply concave at the base, the inner basal margin recurved, 10 mm long, 5 mm wide. **Petals** inserted along the

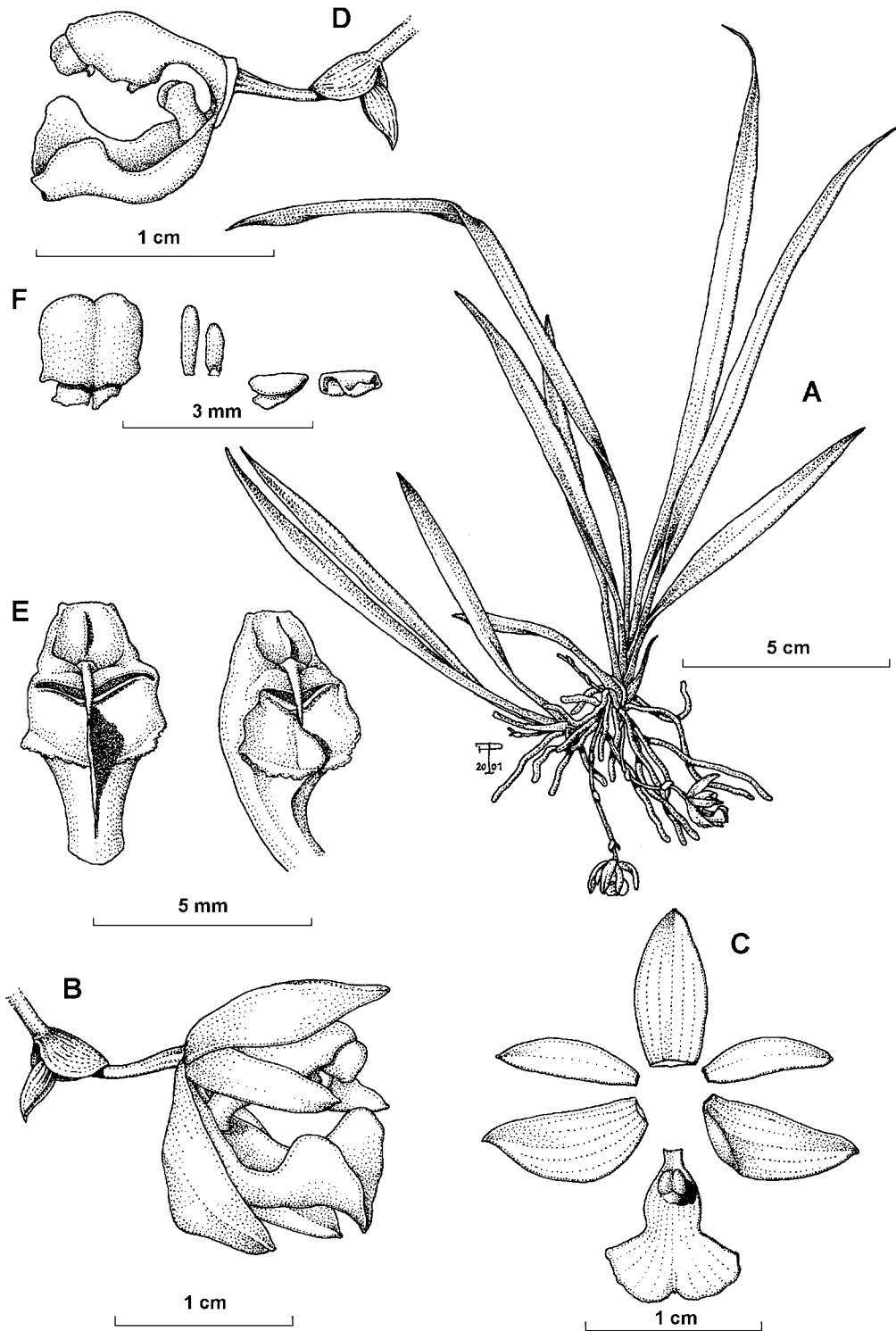


FIGURE 3. *Kefersteinia angustifolia* Pupulin & Dressler. A, habit; B, flower; C, perianth parts dissected; D, column and lip (lateral view); E, column (ventral and three-quarters views); F, anther cap, pollinia, and stipe. Drawn from the holotype.

column foot, narrowly elliptic, acute, minutely apiculate, slightly concave toward the apex, 8 mm long, 2.0–2.5 mm wide. **Lip** with a short linear claw, 3-lobed, spatulate-flabellate, retuse, concave, 9 mm long, 8 mm wide, the margins upcurved; callus subbasal, pedicellate, obpeltate, bilobed, about 2.5 mm high, 2 mm wide, 1.5 mm long. **Column** elongate, with an inconspicuous foot, 7 mm long, 3 mm wide at the middle, from a narrow base, the ventral surface forming a transversely subrectangular plate, basally protruding into a transversal keel, the margins lacerate, provided with a high, triangular, median longitudinal keel. **Anther cap** cucullate, subquadrate, compressed, retuse at apex, 4-celled. **Pollinia** 4, in 2 pairs of different size, linear to narrowly oblong, on a rather large, obtriangular, folded stipe.

**Distribution:** Known only from Panama.

**Ecology and phenology:** Epiphytic in lower montane moist forest around 1000 m elevation. Flowering occurs at least in October.

**Etymology:** From the Latin *angustus*, “narrow,” and *folium*, “leaf,” in reference to the narrowly ligulate leaves of this species.

Among the species of sect. *Umbonatae* Sengh. & G. Gerlach, *Kefersteinia angustifolia* may be recognized by its very narrow, linear leaves, the proportionately small petals, the peculiar spatulate-flabellate lip, and the lacerate proximal margins of the plate below the stigma. Although leaf shape is usually not a reliable character for species identification in *Kefersteinia*, Pupulin (2001) noted that it allows field recognition of several species, and *K. angustifolia* has the narrowest leaves among Mesoamerican taxa.

*Kefersteinia elegans* Garay, Orquideología 4: 80. 1969. TYPE: COLOMBIA. Antioquia: without locality, *G. Escobar 507* (Holotype: AMES).

Among the species of *Kefersteinia* from the Andes of South America, *K. elegans* may be recognized for its large, yellowish flowers and the peculiar elliptic wings of the column. It was described by Garay (1969) from a specimen collected in the Department of Antioquia, and hitherto was thought to be endemic to the Andes of Colombia. Now we can report for the first time the presence of *K. elegans* in Panama.

**Specimen examined:** Panama. Bocas del Toro, *Núñez & Olmos 111* (MO; PMA, not seen).

In the original description, Garay (1969) compared *Kefersteinia elegans* with *K. taurina*

(Rchb.f.) Rchb.f., but the two species are only distantly related. *Kefersteinia taurina*, from Colombia and western Ecuador, has a stipitate callus and a clavate column without wings, basally gibbous, whereas *K. elegans* has a laminar callus, prominent wings in the distal portion of the column, and a high substigmatic keel. Dodson and Dodson (1982) illustrated in detail *K. taurina* from Ecuador. It agrees well with Reichenbach's type (Colombia. Medellín, *Roehl s.n.*, W-R), although it shows three low lamellae on the column underside instead of the globose projection Reichenbach sketched from the holotype (W-R 49601). *Kefersteinia elegans* was illustrated only with a photograph of the flower from the type at the time of its publication, so a detailed illustration is provided here based on Panamanian material (Fig. 4).

*Kefersteinia tinschertiana* Pupulin *sp. nov.* TYPE: GUATEMALA. Suchitepéquez: Finca Santa Adelaida, Santa Bárbara, shade trees in coffee and cardamon plantations, 900 m, Oct. 1982, *M. & M. Dix & D. Montúfar 6630* (Holotype, MO; Isotype: UVAL). Fig. 5.

*Species Kefersteiniae microchariti* Schltr. *similis, labello obovato apice profunde bilobato, callo duabus laminis suberectis dolabroformibus formato, columna obscuris transversalibus carinis numerosis ornata difert.*

**Plant** epiphytic, erect, cespitose, to about 14 cm tall, each shoot provided with 2–3 leaves and 2–3 acute, triangular bracts at the base.

**Roots** flexuous, glabrous. **Leaves** narrowly lanceolate-elliptic, acuminate, to 12 cm long, 1.6 cm wide, narrowing at the base into a conduplicate petiole 1 cm long. **Inflorescence** a pendent, solitary flower; peduncle terete, slender, to 2.5 cm long, with 2 cucullate, widely ovate, subacute bracts. **Floral bracts** in pairs, cucullate, obtuse, membranaceous, to 3.5 mm long, about 3 mm wide, the inner one narrower. **Ovary** subclavate, 8 mm long including the pedicel. **Flowers** showy, the lip white translucent, the petals and sepals with maroon dots; the callus solid white with faint maroon dots at base. **Dorsal sepal** elliptic-lanceolate, obtuse, apiculate, concave toward the apex, 12 mm long, 5 mm wide. **Lateral sepals** elliptic to elliptic-lanceolate, acute, minutely apiculate, concave, the inner basal margin recurved, 13 mm long, 6 mm wide. **Petals** obliquely lanceolate, subacute, apiculate, 11 mm long, 5 mm wide. **Lip** sessile, widely obovate-suborbic-

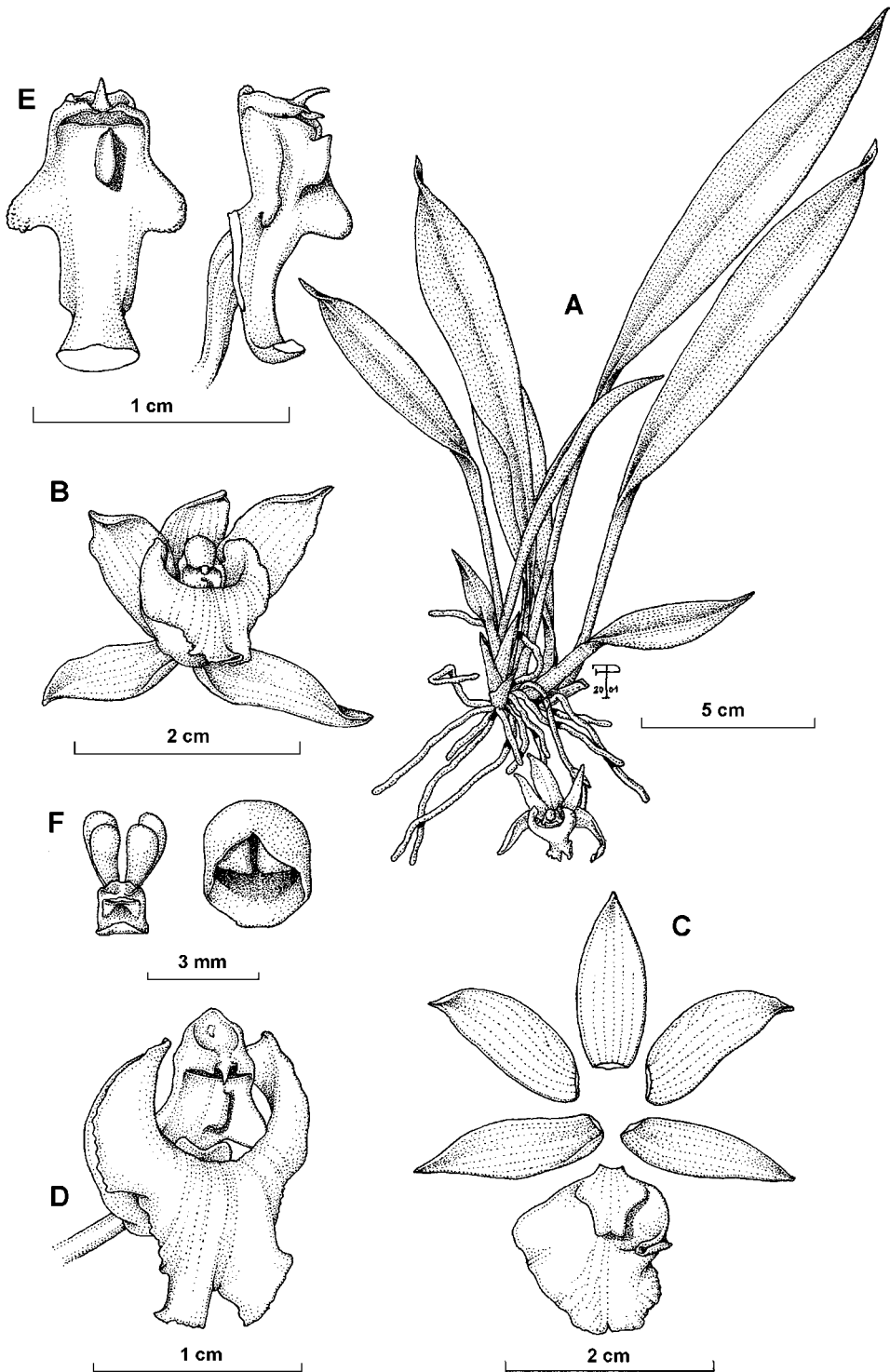


FIGURE 4. *Kefersteinia elegans* Garay. A, habit; B, flower; C, perianth parts dissected; D, column and lip (three-quarters view); E, column (ventral and three-quarters views); F, pollinarium and anther cap. Based on Núñez & Olmos III (MO).

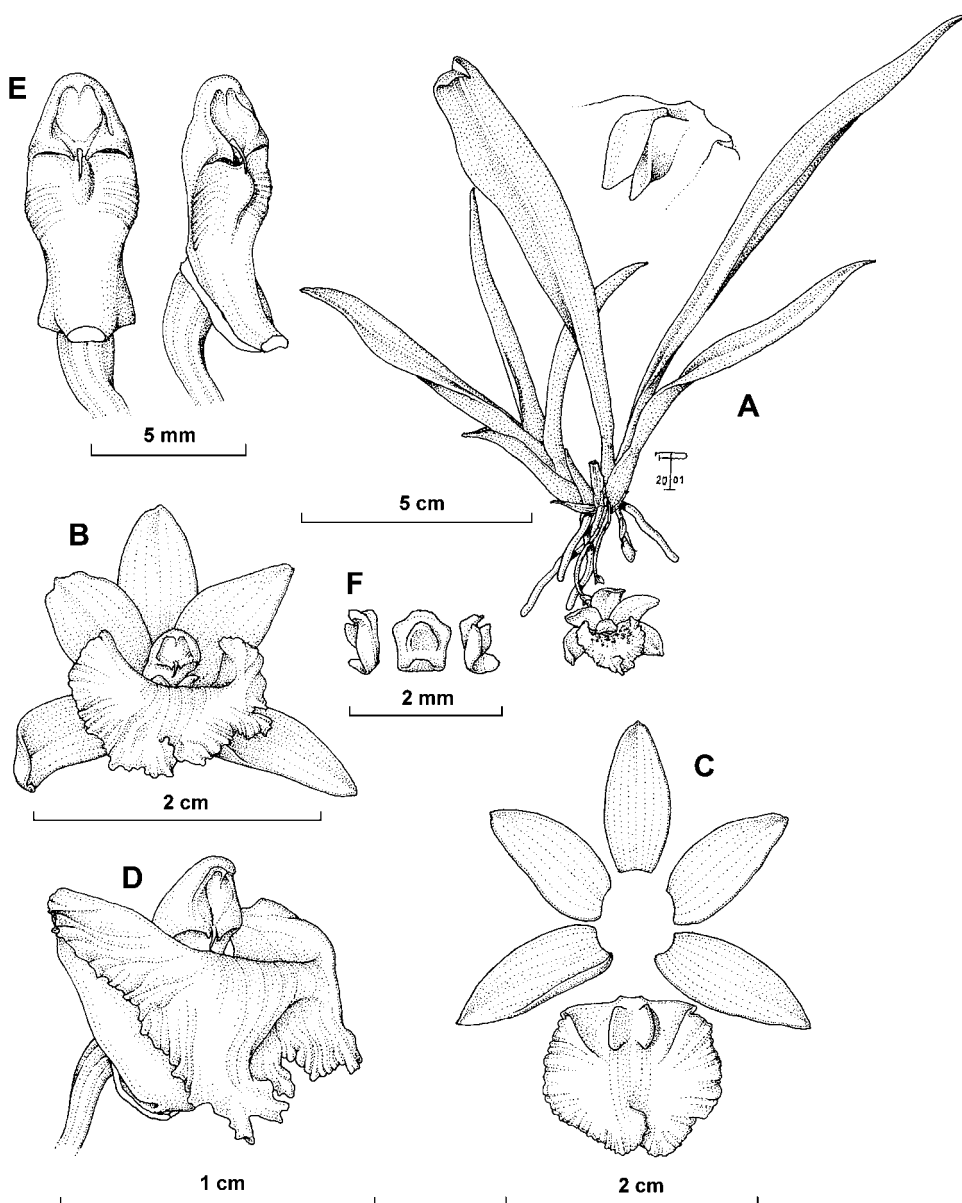


FIGURE 5. *Kefersteinia tinschertiana* Pupulin. A, habit; B, flower; C, perianth parts dissected; D, column and lip (three-quarters view); E, column (ventral and three-quarters views); F, stipe (lateral, ventral, and three-quarters views); G, callus. Drawn from the holotype.

ular, deeply bilobed at apex, concave toward the base, the apical half abruptly folding back, 13 mm long, 14 mm wide, the basal margins erect, then subcrenulate to apex; callus basal, bilobed, each lobe a flat, dolabriform, suberect lamina, sulcate along the middle, about 3 mm long, 3.5 mm wide. **Column** subterete, with a distinct foot, 9 mm long, 4 mm wide at the mid-

dle, from a narrow base, with inconspicuous, rounded wings, the ventral surface provided with multiseriate, transversal, low keels and a median, short, rounded, fleshy longitudinal keel. **Pollinia** 4, in 2 pairs of different size, on a short, obovate-subquadrate, obtuse stipe.

**Distribution:** Known only from Guatemala.

**Ecology and phenology:** Epiphytic in shade



in premontane wet forest, Pacific slopes of the Sierra Madre at about 1000 m elevation. Flowering occurs at least in October.

**Eponymy:** Named in honor of Otto Tinschert, for his outstanding contributions to the orchidology of Guatemala.

*Kefersteinia tinschertiana* is a member of a Central American group related to *K. lactea* (Rchb.f.) Schltr. Its closest relatives are part of the mainly Andean complex of species associated with the type of the genus, *K. graminea* (Lindl.) Rchb.f., distinguished by the lamina of the lip folded back at the middle, and by the sessile, laminar callus. The presence in

Guatemala of a *Kefersteinia* species close to *K. lactea* was first recorded by Dix and Dix (2000) in their annotated checklist. However, the closest relative of *K. tinschertiana* in Mesoamerica is not *K. lactea* but *K. microcharis* Schltr. from Costa Rica, which presents a shortly bilobed lip, a column without prominent wings, as well as a short, fleshy, high keel under the stigma. *Kefersteinia tinschertiana* may be distinguished from *K. microcharis* by the obovate lip deeply bilobed at apex, the callus formed by two flat, dolabriform, suberect plates, and the multiseriate, low, transversal keels on the ventral surface of the column.

#### KEY TO THE MESOAMERICAN SPECIES OF *KEFERSTEINIA*

- 1a. Callus stipitate . . . . . 2  
 1b. Callus sessile, laminar, or carinate . . . . . 10  
 2a. Lateral margins of the lip folded toward column . . . . . (sect. *Umbonatae*) 3  
 2b. Lateral margins of lip not folded toward column . . . . . (*K. costaricensis* group) 6  
 3a. Lip entire or slightly subpandurate . . . . . *K. wercklei*  
 3b. Lip distinctly 3-lobed. . . . . 4  
 4a. Apex of lip acute. . . . . *K. excentrica*  
 4b. Apex of lip retuse . . . . . 5  
 5a. Lip obovate-pandurate . . . . . *K. retanae*  
 5b. Lip spatulate-flabellate . . . . . *K. angustifolia*  
 6a. Lip suborbicular, folded down at middle . . . . . 7  
 6b. Lip obovate, not folded down at middle . . . . . 9  
 7a. Lip provided with lateral lobes at the base. . . . . *K. auriculata*  
 7b. Lip without lateral lobes at the base. . . . . 8  
 8a. Lateral sepals reflexed; lobes of the callus subquadrate . . . . . *K. orbicularis*  
 8b. Lateral sepals not reflexed; lobes of the callus ovate . . . . . *K. alata*  
 9a. Margins of lip crisped; lobes of the callus transversally elliptic, much wider than long . . . . . *K. maculosa*  
 9b. Margins of lip not crisped; lobes of the callus ovate, longer than wide . . . . . *K. costaricensis*  
 10a. Lip much shorter than sepals, more or less straight . . . . . 11  
 10b. Lip subequal to the sepals, abruptly bent down at middle . . . . . (sect. *Kefersteinia*) 12  
 11a. Lip pandurate; callus cushionlike . . . . . *K. parvilabris*  
 11b. Lip spatulate; callus of two keels reflexed distally . . . . . *K. endresii*  
 12a. Flowers yellow; keel of the column rectangular . . . . . *K. elegans*  
 12b. Flowers white with sparse spots on lip; keel of the column rounded . . . . . (*K. lactea* group) 13  
 13a. Column oblong-elliptic, without wings . . . . . 14  
 13b. Column winged at the middle. . . . . 15  
 14a. Lip ovate, notched; callus flat . . . . . *K. microcharis*  
 14b. Lip obovate, deeply bilobed; callus suberect . . . . . *K. tinschertiana*  
 15a. Column with a prominent abaxial keel; lip ovate-oblong, entire . . . . . *K. lactea*  
 15b. Column with inconspicuous abaxial keel; lip rhombic, 3-lobed. . . . . *K. alba*

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