The anomalous-stemmed species of Heteropterys subsect. Aptychia (Malpighiaceae)

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Amorim, A. M. (Universidade Estadual de Santa Cruz, Departamento de Ciências Biológicas, Ilhéus, 45.650–000, Bahia, Brazil; e-mail: aamorimm@terra.com.br). The anomalous-stemmed species of *Heteropterys* subsect. *Aptychia* (Malpighiaceae). Brittonia 55: 127–145. 2003.—Species of the anomalous-stemmed complex of *Heteropterys* are revised after intensive fieldwork in eastern Brazil. *Heteropterys patens* (=*H. anomala*) is redefined, and three new species are described (**H. admirabilis**, **H. imperata**, and **H. nordestina**). In addition, this treatment provides brief synonymy, lectotypifications, illustrations, and comments for those four species, and a key to all taxa of the complex.

Key words: Malpighiaceae, *Heteropterys*, *Aptychia*, Brazil, anomalous-stemmed.

Amorim, A. M. (Universidade Estadual de Santa Cruz, Departamento de Ciências Biológicas, Ilhéus, 45.650–000, Bahia, Brazil: e-mail: aamorimm@terra.com.br). The anomalous-stemmed species of *Heteropterys* subsect. *Aptychia* (Malpighiaceae). Brittonia 55: 127–145. 2003.—Espécies do complexo de ramos anômalos de *Heteropterys* são revisadas com base em coleções atualmente disponíveis e em intensivo trabalho de campo realizado no leste do Brasil. *Heteropterys patens* (=*H. anomala*) é redefinida e três novas espécies são descritas (**H. admirabilis**, **H. imperata**, e **H. nordestina**). Em adição, esse tratamento providencia breves sinônimos, lectotipificações, ilustrações e comentários para essas quatro espécies e uma chave analítica para todos os taxa do complexo.

Heteropterys is a large and taxonomically difficult genus of Malpighiaceae. The species of *Heteropterys* are tremendously diverse in their vegetative and floral morphology but share a noteworthy apomorphy in fruit shape: the dorsal wing of the samara is prominent, thickened on the abaxial edge, and the lateral wings are strongly reduced or absent. All species are found in the Neotropics and just one species is common to both the Old World and New World, occurring in western Africa, Central America, and northern South America (C. Anderson, 2001).

The monophyly of *Heteropterys* is still unconfirmed, but recent analyses using ITS molecular data from 23 species in this genus showed *Heteropterys* to be a natural lineage (Amorim, Davis, & Anderson, unpubl. data). Molecular studies (Cameron et al., 2001; Davis et al., 2001) have placed this genus in a clade with other genera in which a lateral wing of the samara is prominent; according to the authors, this clade is poorly supported and more data are needed to improve the results. Ongoing taxonomic studies, especially of the subgenus *Heteropterys* (Amorim, 2001, 2002; W. Anderson, 1997, 1998, 2001), generally follow the infrageneric classification of Niedenzu (1928) because that is still the most recent study of the genus.

This article is part of my taxonomic revision of the subsection *Aptychia*, an assemblage of species with sessile pedicels. Specimens of the anomalous-stemmed complex are lianas or rarely small shrubs that occur in coastal Brazil from Rio Grande do Norte to northern São Paulo. They generally have stems conspicuously bearing xylem cylinders that are slightly or deeply dissected but complete. These plants

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show striking variation in leaf form and size, but are easily recognized vegetatively (Fig. 1): the cross-section of the basal part of the stem is generally irregularly sulcate, flattened, or divided into three or more lobes; the petiole bears a pair of glands at base; the lamina is generally very soon glabrescent; and the margins bear many small glands and short cilia, especially in young leaves.

The vegetative and floral variability have long obscured the fact that this complex comprises more than just the two species recognized by Jussieu: *Heteropterys anomala* A. Juss. (the commonly used name) and *H. patens* (Griseb.) A. Juss. (an overlooked name). Two species, *H. bullata* Amorim and *H. oberdanii* Amorim, were recently described, and three new species (*H. admirabilis*, *H. imperata*, and *H. nordestina*) are proposed here on the basis of intensive fieldwork, analyses of herbarium collections, and careful delimitation of the species concepts in this group.

Key to the anomalous-stemmed species of *Heteropterys* subsect. *Aptychia*

1. Petioles confluent across the node and forming a corky ridge; lamina with lateral veins and reticulum deeply impressed above and prominent below, producing a bullate surface (coastal forests of highest mountains, Bahia. ..... *H. bullata*
1. Petioles not confluent; lamina not bullate, the lateral veins slightly prominent below and reticulum very fine or inconspicuous on both surfaces.
   2. Bract 1–2.2 mm long; pedicel 3.5–5 mm wide distally; all petals orange or pale yellow suffused with red; samara usually (38–)46–77 mm long at maturity; nut 8–14 mm diam.
      3. Accessory branches of inflorescence evident; pedicel 3.5–7.3 mm long, abruptly thickened distally; lateral petals thickened in center of limb but not carinate; limb of posterior petal triangular; filament of stamen opposite anterior sepal ca. 5.2 mm long, coherent with adjacent filaments and bent inward; connective of anthers distally widened so as to displace the locules laterally and sometimes elongated so as to exceed the locules (coastal forests of highest mountains, Espírito Santo) ..... *H. admirabilis*
      3. Accessory branches of inflorescence, if present, very reduced; pedicel 10.4–18 mm long, gradually thickened distally; lateral petals dorsally carinate; limb of posterior petal suborbicular; filament of stamen opposite anterior sepal ca. 3.6 mm long, not coherent with adjacent filaments; connective not widened and equalling the locules (coastal forests of the hills in the state of Rio de Janeiro and restinga forests in northern part of the state of São Paulo) ..... *H. patens*
   2. Bract 0.6–1 mm long; pedicel 1.7–2.5(–2.8) mm wide distally; all petals yellow lacking red; samara usually 30–44(–48) mm long at maturity; nut 4–6(–8) mm diam.
      4. Cross-section of basal part of stems always cylindrical; leaves appressed; pedicel 3.5–5.7 mm long; flowers borne ultimately in pseudoracemes containing 4–20 decussate flowers; samara reddish pink at maturity, borne horizontally (permanently flooded restinga forests, Espírito Santo) ..... *H. oberdanii*
      4. Cross-section of basal part of stems cylindrical, irregularly sulcate, flattened, or divided into 3 or more lobes; leaves spreading; pedicel 7–10 mm long, rarely shorter; flowers borne ultimately in 4–6-flowered umbels; samara pale brown at maturity, borne erect when single, obliquely or eventually horizontally when 2 or 3 develop.
         5. Inflorescence generally spreading or (in plants from sandy areas) slightly contracted; sepals obtuse or rounded at apex, 1.3–1.5 mm long; lateral petals membranous, slightly thickened in center of limb, or sometimes strongly carinate; limb of lateral petals 3.5–4.2(–4.8) mm long; filaments opposite 2 posterior-lateral petals 2.9–3.5 mm long; styles 2.9–3.3 mm long (tabuleiro, restinga, semi-deciduous, and moist forests throughout coastal range from Rio Grande do Norte to Espírito Santo) ..... *H. nordestina*
         5. Inflorescence often contracted; sepals triangular at apex, 1.8–2.5 mm long; lateral petals strongly carinate; limb of lateral petals 4.5–5.5 mm long; filaments opposite 2 posterior-lateral petals 4–4.3 mm long; styles 4–4.5 mm long (restinga and moist forest in coastal range or dry forests inland, Bahia) ..... *H. imperata*

Heteropterys admirabilis Amorim, sp. nov. (Fig. 2)

TYPE. BRAZIL. Espírito Santo: Mun. Domingos Martins, próximo a Vitor Hugo, BR 262, braço sul do Rio Jucu, 17 Jan 1995 (fl), *G. Hatschbach & J. M. Silva 61604* (HOLOTYPE: MBM; ISOTYPE: MICH).

Liana basi ramis teretibus, sulcatis vel complanatis. Lamina foliorum majorum 8.5–25 cm longa, 6.5–17

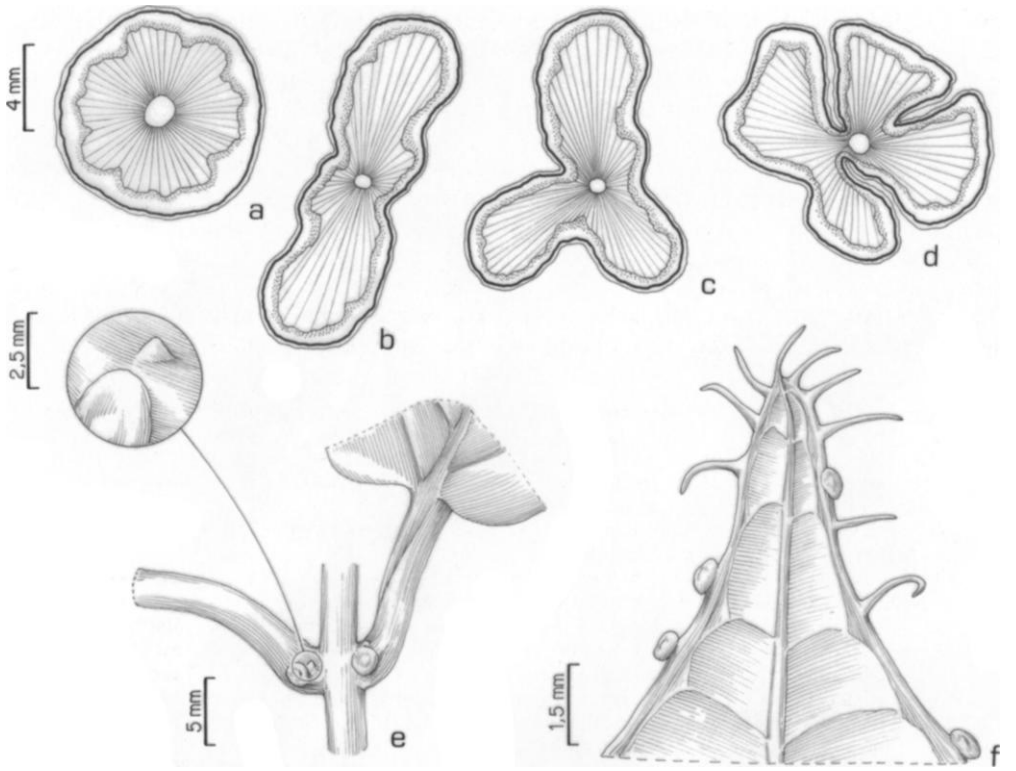

FIG. 1. *Heteropterys nordestina*. a–d. Schematic drawings of cross-sections of the basal part of the stem: **A**. Cylindrical cross-section. **B**. Flattened cross-section. **C**. 3-lobed cross-section. **D**. 4-lobed cross-section. **E**. Stem node showing the biglandular petiole with enlarged view of stipule and part of one gland. **F**. Detail of young leaf apex showing the marginal glands and cilia. (a–f from *Amorim et al. 3474*, CEPEC.)

cm lata, ovata, oblonga, elliptica, subrotundata, ovato-lanceolata, cordato-orbiculata, oblongo-lanceolata vel late lanceolata, utrinque glabrata; petiolus 16–35 mm longus, basi biglandulifer. Panicula 20–38 cm longa, in ramis deflexis, umbellis congestis 4–6-floris, pedunculo florifero nullo, pedicello 3.5–7.3 mm longo, 1.2–5 mm diametro, abrupte incrassato versus apicem. Petala flava et rubra, in alabastro exposita, patentia, dorsaliter laevia, petala lateralia limbo orbiculato et concavo, petalum posticum limbo triangulato et plano; filamenta heteromorpha, illa petalis postico-lateralibus opposita plerumque longiora crassioraque; antherae inaequales, connectivo distaliter dilatato loculos aequanti vel superanti et lateraliter luxanti; styli postici lyrati, apice dorsaliter apiculati. Samarae 38–50 mm longae, nuce 8–9 mm diametro, lateraliter laevi.

Liana, climbing to 5–20 m; stems at base 2–6 cm diam., the cross-section cylindrical, irregularly sulcate, or rarely slightly flattened, twisted, glabrate, developing small scattered lenticels. *Leaves* mostly plane, opposite or rarely subopposite on the same stem, spreading; petiole 16–35 mm long, initially sericeous and soon glabrate, bearing a pair of glands at base, each gland 2–3 mm diam.; stipules present on petiole, above base, as minute protuberances 0.1–0.3 mm long, apparently absent from old leaves; lamina of larger leaves (8.5–)10.2–23.8(–25) × (6.5–)7–16.8(–17) cm, membranous, ovate, oblong, elliptic, subrotund, ovate-lanceolate, or cordate-orbicular, rarely oblong-lanceolate or widely lanceolate, often asymmetrical, obtuse, rounded or cordate, rarely slightly cuneate at base, acute, cuspidate, retuse to obtuse-rounded, rarely acuminate at apex, the margins bearing toothlike extensions with many small glands or short cilia on borders, especially in young leaves, glabrous or initially sparsely sericeous (with short, appressed, medifixed hairs) and soon glabrescent, the lateral veins slightly prominent below, reticulum very fine and more visible below than above. *Inflorescence* pa-

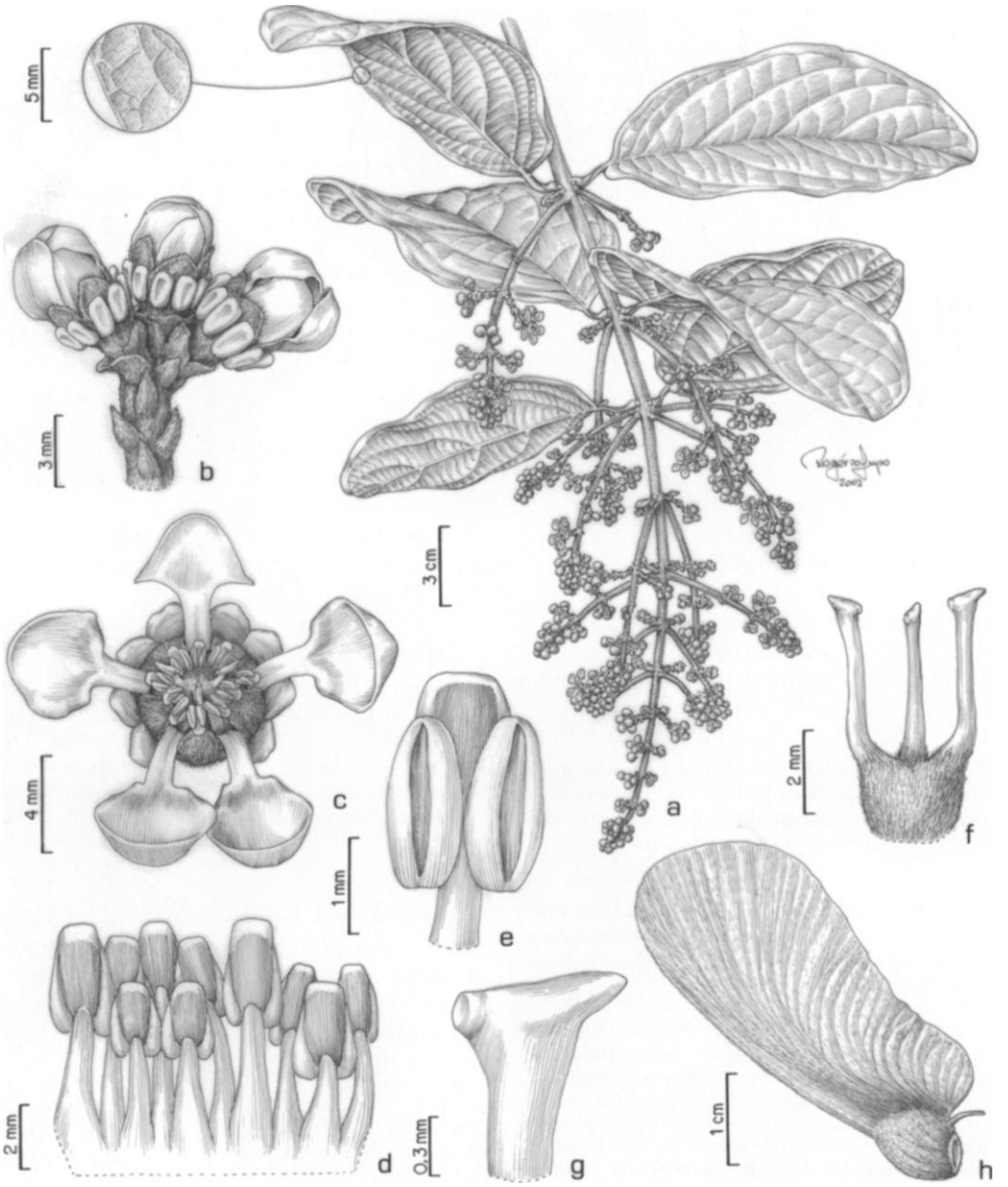

FIG. 2. *Heteropterys admirabilis*. **A**. Flowering branch with enlarged abaxial view of leaf margin. **B**. Umbel of flower buds. **C**. Flower, from above. **D**. Androecium, laid out, abaxial view, the stamen second from right opposite the posterior petal, stamen fourth from left opposite the anterior sepal. **E**. Detail of one anther, adaxial view. **F**. Gynoecium, anterior style in middle. **G**. Detail of apex of posterior style. **H**. Samara. (a–g from the holotype, *Hatschbach & Silva 61604*, MBM; h from *Hatschbach et al. 61181*, MBM.)

niculate, spreading, 20–38 cm long, primary branches 10–22, 0.5–15.5 cm long, secondary branches 6–18 or absent, 0.5–2 cm long, tertiary branches if present ca. 0.5 cm long, accessory branches evident; terminal or axillary, densely and persistently brown-sericeous, pendulous, with the flowers borne ultimately in congested and dense 4–6-flowered umbels; inflorescence bracts like leaves, gradually or

abruptly reduced to 5–6 × ca. 3.6 mm, the margins entire, biglandular at base or eglandular, the glands ca. 1.5 mm diam., bright green; peduncle absent; bracts 1.9–2.2 × 2.4–2.5 mm, broadly ovate, eglandular or bearing 1–2 small glands at base, abaxially densely sericeous, adaxially glabrous; bracteoles like bracts but smaller, eglandular; pedicel (3.5–)4–7.3 × 1.2–5 mm, straight, densely brown-sericeous, abruptly thickened distally. *Sepals* 3–3.5 × 2.5–3 mm, brown, rounded at apex, strongly appressed against filaments in anthesis, abaxially densely sericeous, adaxially glabrous, the anterior sepal eglandular, the lateral 4 biglandular, the glands 3.5–4.7 mm long, elliptic. *Petals* exposed in the enlarging bud, pale yellow suffused with red principally near the claw, glabrous, thickened in center of limb but not carinate; lateral petals spreading, margins proximally strongly erose and revolute in anthesis (principally 2 posterior-lateral petals), claw 3.2–3.5 mm long, limb 4–5 × 4.5–5 mm, orbicular and deeply concave; posterior petal sub-erect, glandular-thickened at margins, claw 3.5–3.7 mm long, limb ca. 3.5 × 4.2 mm, triangular and nearly flat. *Stamens* glabrous; filaments strongly heteromorphic, 3.7–5.2 × 0.3–0.9 mm, connate ⅓–½ their length, the 2 stamens opposite posterior-lateral petals much thicker than others and straight, ca. 5 mm long, longest stamen opposite anterior sepal coherent with adjacent filaments and bent inward, ca. 5.2 mm long, shortest stamen opposite posterior petal, ca. 3.7 mm long, other stamens 4–4.5 mm long; anthers (1.8–)2–2.5(–2.8) mm long, strongly unequal, reflexed in anthesis, connective distally widened so as to displace the locules laterally and sometimes elongated so as to exceed the locules, the proximal ⅔–⅘ dark red, the distal ⅕–⅓ pale yellow. *Ovary* 1.5–1.7 mm high, densely sericeous; styles 3.5–4.2 mm long, equalling or slightly exceeding the anthers, glabrous or proximally sericeous, all 3 with a flattened elliptic top and internal stigma; anterior style nearly straight, dorsally strongly apiculate at apex; posterior styles somewhat lyrate, usually dorsally slightly apiculate at apex. *Samara* brown at maturity, (38–)46–50 mm long, borne obliquely, thinly sericeous to glabrate; dorsal wing almost as long as samara, 30–40 × 15–20 mm, the abaxial edge nearly straight; nut 8–9 mm diam., subspheroidal, smooth-sided, without lateral crests or winglets.

Distribution and habitat.—In the moist Atlantic coastal forest, between 600 and 900 m in Espírito Santo (Fig. 3). *Heteropterys admirabilis* grows in primary forest and advanced secondary forest, usually along rivers. It can be found in the canopy or below the canopy in shaded areas.

Etymology.—The specific epithet refers to the admirable aspect of the flowers, which are very different in size and shape when compared to flowers of other species in this complex.

Phenology.—Flowering in January, February, and November; fruiting in March, August, and October.

Additional specimens examined: BRAZIL. **Espírito Santo**: Mun. Alfredo Chaves, São Bento de Urânia, 14 Jan 1995 (imm fl), *Hatschbach & Silva 61419* (MBM, MICH); Mun. Domingos Martins, 9 Oct 1994 (fr), *Hatschbach et al. 61181* (MBM, MICH); Mun. Fundão, Goiapaba-Açu, 5 Aug 1998 (imm fl), *Kollmann et al. 321* (CEPEC, MBML); Mun. Santa Teresa: Lombardia, 25 Aug 1998 (fr), *Kollmann et al. 423* (CEPEC, MBML); Santo Antônio, 15 Feb 2000 (imm fl), *Amorim et al. 3316* (CEPEC, MBML, MICH, SP, VIES); Estação Biológica Caixa D'Água; 21 Mar 1988 (fr), *Fernandes 2417* (CEPEC, MBML, SP), 24 Nov 1998 (fl), *Kollmann et al. 1079* (CEPEC, MBML); Mun. Vitor Hugo, São Bento de Urânia, 19 Feb 2000 (fl), *Amorim et al. 3339* (CEPEC, MBML).

Heteropterys admirabilis closely resembles *H. patens* in leaf shape and the red pigmentation of the petals, but differ in other floral characteristics. *Heteropterys admirabilis* has an inflorescence with evident accessory branches, a distinctly shorter pedicel (3.5–7.3 mm long) that is abruptly thickened distally, petals thickened in the center of the limb but not carinate, and a triangular posterior petal, whereas *H. patens* has an inflorescence with no or very reduced accessory branches, the pedicel long (10.4–18 mm long) and gradually thickened distally, the lateral petals slightly carinate dorsally, and a suborbicular posterior petal. However, the most striking characteristic of *H. admirabilis* is the anthers of which the connective is widened distally so

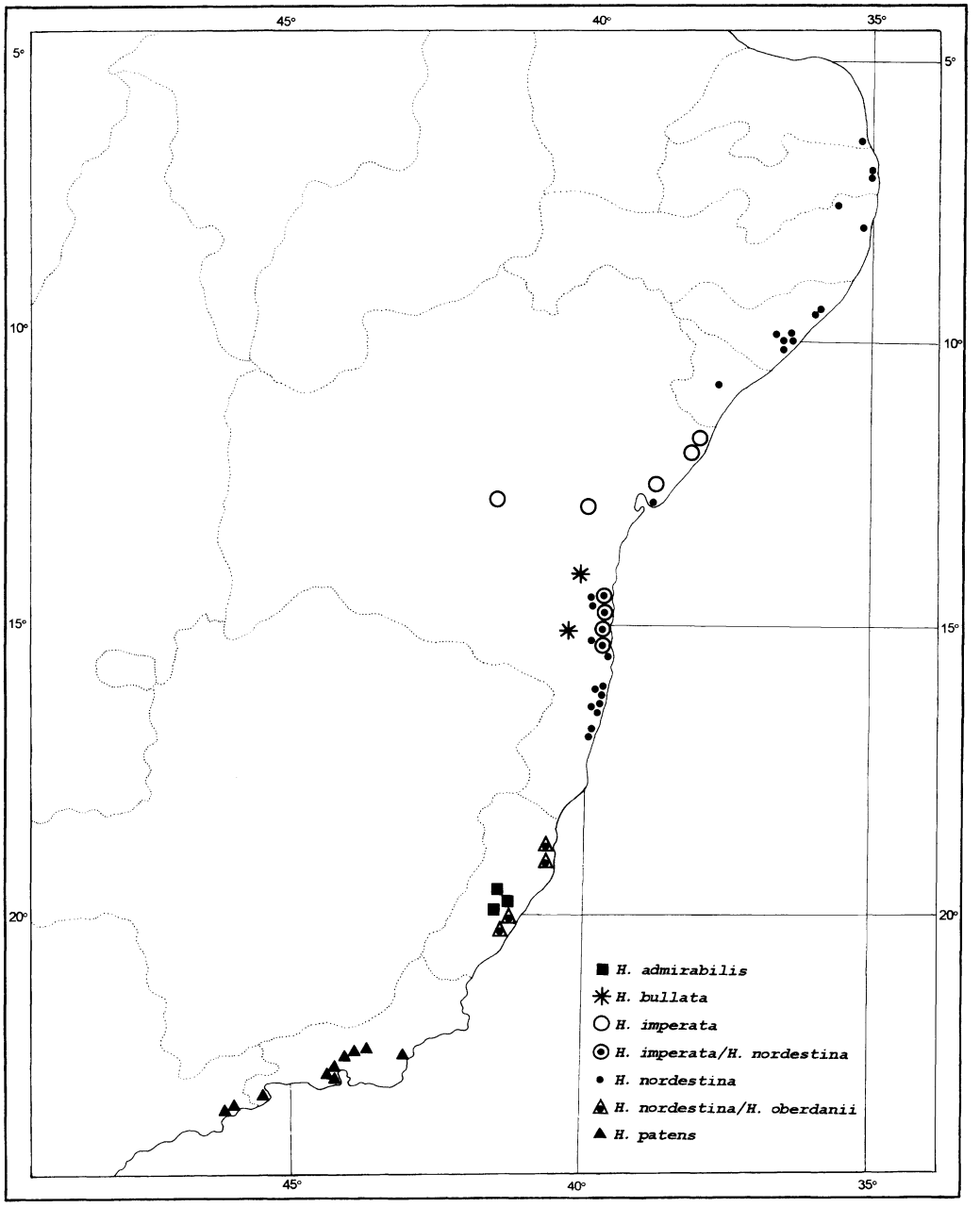

FIG. 3. Distribution of the anomalous-stemmed species of *Heteropterys* subsect. *Aptychia* in easternmost Brazil.

as to displace the locules laterally and is sometimes elongated so as to exceed the locules. In this respect, *H. admirabilis* differs from all species in this complex. Other differences in size of the floral structures are presented in Table 1.

Heteropterys imperata Amorim, sp. nov. (Fig. 4)

TYPE. BRAZIL. Bahia: Mun. Uruçuca, 7.3 km na estrada Serra Grande/Itacaré, Fazenda Lagoa do Conjunto Fazenda Santa

TABLE I
COMPARISON OF SPECIES OF THE "ANOMALOUS-STEMMED COMPLEX" OF *Heteropterys*

Character length	H. admirabilis	H. bullata (Amorim, 2002)	H. imperata	H. nordestina	H. oberdanii (Amorim, 2002)	H. patens
petiole—mm long	16–35	(22–)32–48	(10–)15–22	(5–)11–21	6–17	16–45
petiole gland—mm diameter	2–3	0.8–2.5	1.5–2.2	1.2–1.6	ca. 0.6	1.2–1.6
lamina—cm	8.5–25 × 6.5–17	7.9–14.2 × 3.2–9.5	6.5–20.3 × 4.3–13	5–15.8(–20.5) × 4–9(–13)	5–11 × 2.4–5	6.5–23 × 4.5–16.5
bract—mm	1.9–2.2 × 2.4–2.5	0.5–1 × 1.3–1.6	0.8–0.9 × 1.5–1.7	0.7–1 × 0.8–1.3	0.6–0.8 × 1.5–1.6	1–1.6 × 2–2.1
	3.5–7.3 × 1.2–5					10.4–18 × 1.6–3.5
pedicel—mm	3–3.5 × 2.5–3	4.8–6.6 × 1.1–2.6	8.5–10 × 1.5–2.8	(3.5–)5.2–8.5 × 0.9–1.9	3.5–5.7 × 1.6–2.5	1.7–2 × 2.2–2.5
sepal—mm		1.6–1.8 × 1.4–1.6	1.8–2.2 × 1.8–2.4	1.3–1.5 × 1.4–1.8	1.5–2 × 1.6–2	
gland of sepal—mm long	3.5–4.7	2.4–2.9	1.9–3	1.7–2.4	1.1–2.5	2–2.7
claw of lateral petal—mm long	3.2–3.5	ca. 2.2	2.5–3	2–2.8(–3)	2.7–3.2	1.7–2.2
limb of lateral petal—mm	4–5 × 4.5–5	3.4–3.8 × 2.7–3	4.5–5.5 × 4.5–5	3.5–4.2(–4.8) × 2.1–3.8 (–4.5)	3.8–5 × 4.1–5.5	3–3.2 × 3–3.2
claw of posterior petal—mm long	3.5–3.7	ca. 3.7	3–3.3	3–3.7	3.5–4	2.5–3
limb of posterior petal—mm	ca. 3.5 × 4.2	2.5–3 × 2.7–2.9	4–4.5 × 4.2	2.5–3(–4) × (2.4–)3.1–3.3	3.2–3.7 × 4–4.2	ca. 3 × 2.7–3.1
filaments opposite 2 posterior-lateral petals—mm long	ca. 5	ca. 2	4–4.3	2.9–3.5	3.2–3.4	ca. 3.3
filament opposite anterior sepal—mm long	ca. 5.2	ca. 2.8	4–4.2	2.7–3(–3.4)	ca. 2.2	ca. 3.6
filament opposite posterior petal—mm long	ca. 3.7	ca. 2.6	3–3.2	2–2.5	ca. 2.1	ca. 2.5
	1.8–2.8	1.4–1.6	1.7–2	1.2–1.8(–2.3)	1.1–1.8	1.5–2.2
anthers—mm long	1.5–1.7	1.2–1.4	1.5–1.8	1.3–1.7	1.2–1.4	1.5–2
ovary—mm high	3.5–4.2	3–3.2	4–4.5	2.9–3.3	3–4.3	3.3–3.6
styles—mm long	(38–)46–50	29–52	45–48	37–43	30–32	(52–)67–77
samara—mm long						

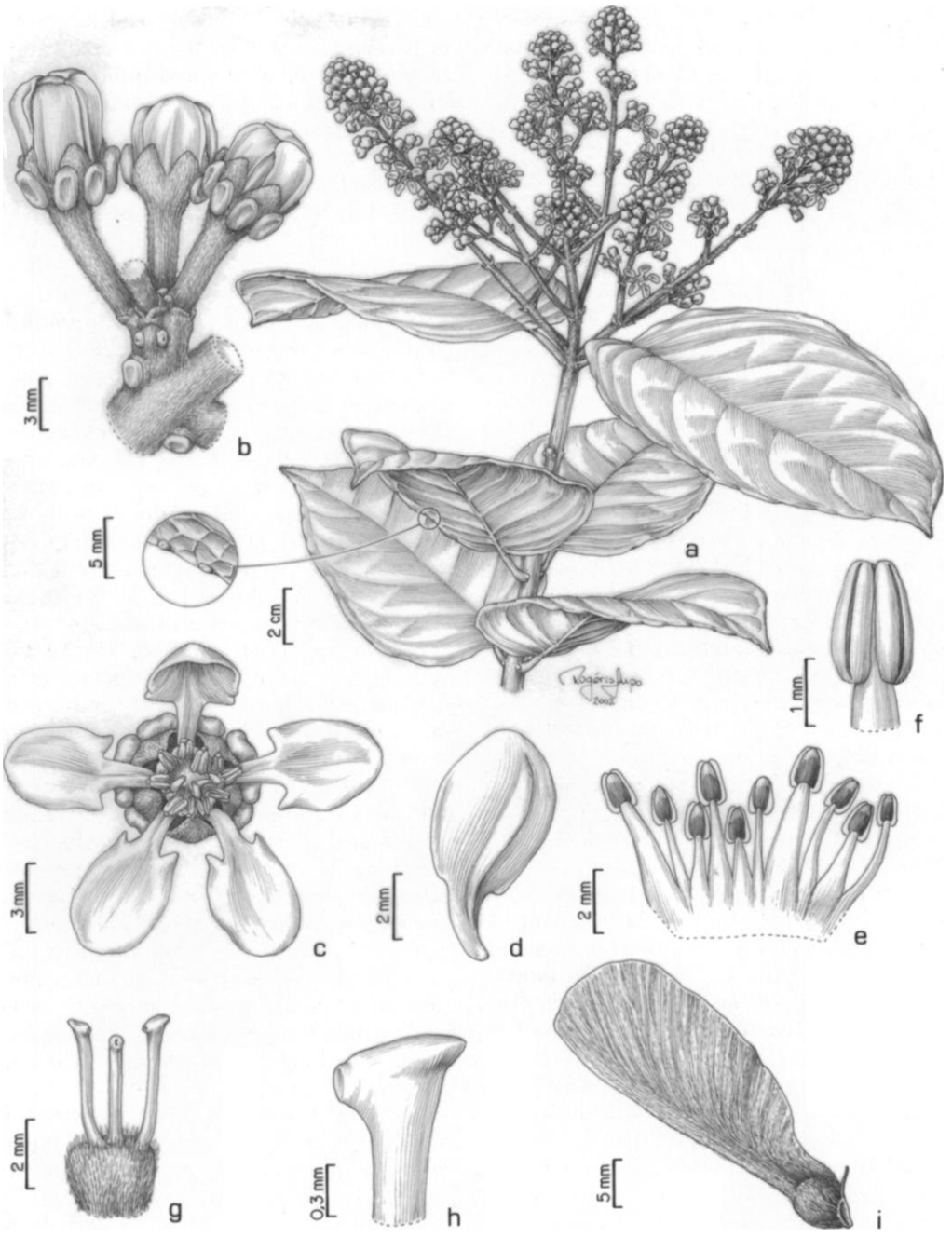

FIG. 4. *Heteropterys imperata*. **A**. Flowering branch with enlarged abaxial view of leaf margin. **B**. Umbel of flower buds, with one partially removed. **C**. Flower, from above. **D**. Lateral petal, abaxial view. **E**. Androecium, laid out, abaxial view, the stamen second from right opposite the posterior petal, stamen fourth from left opposite the anterior sepal. **F**. Detail of one anther, adaxial view. **G**. Gynoecium, anterior style in middle. **H**. Detail of apex of posterior style. **I**. Samara. (a–h from the holotype, *Carvalho et al. 3559*, CEPEC; i from *Amorim et al. 397*, CEPEC.)

Cruz, 14°25′S, 39°01′W, 11–21 Sep 1991 (fl), *A. M. de Carvalho (with W. W. Thomas, T. S. Santos & A. M. Amorim) 3559* (HOLOTYPE: CEPEC; ISOTYPES: HUEFS, MBM, MBML, MICH, NY, SP).

Liana basi ramis teretibus, triangulatis, complanatis vel trilobis. Lamina foliorum majorum 6.5–20.3 cm longa, 4.3–13 cm lata, rotundata, orbiculata, ovata, elliptica, late lanceolata, oblongo-lanceolata interdum oblonga, utrinque glabrata; petiolus 10–22 mm longus, basi biglandulifer. Panicula plerumque contracta, 19.5–26 cm longa, erecta vel suberecta, umbellis 4–6-floris interdum 2 floribus proximalibus adjectis, pedunculo florifero nullo, pedicello 8.5–10 longo, 1.5–2.8 mm diametro, gradatim incrassato versus apicem. Petala lutea, in alabastro exposita, patentia, dorsaliter carinata; filamenta inaequalia; styli postici lyrati, apice pedaliformes dorsaliter apiculati. Samarae 45–48 mm longae, nuce lateraliter laevi.

Liana, climbing to 3–10 m; stems at base 1–3 cm diam., the cross-section cylindrical, triangular, flattened, or deeply divided into 3 lobes, twisted, glabrate, developing small scattered lenticels. *Leaves* mostly plane, opposite, spreading; petiole (10–)15–22 mm long, initially densely sericeous and soon glabrate, bearing a pair of glands at base, each gland 1.5–2.2 mm diam.; stipules present on petiole, above base, as minute protuberances ca. 0.2 mm long, seldom evident, apparently absent from old leaves; lamina of larger leaves (6.5–)8.2–16.7(–20.3) × (4.3–)6.5–13 cm, papery to subcoriaceous, often rounded, orbicular, ovate, elliptic, broadly lanceolate, oblong-lanceolate, or sometimes oblong, obtuse, rounded, cuneate, or slightly cordate at base (sometimes with the petiole partially covered by the base of lamina), rounded, acute, or slightly retuse at apex, the margins bearing many glands and short cilia, especially in young leaves, occasionally with impressed glands scattered below, glabrous or initially sericeous (with short, appressed, medifixed hairs) and soon glabrescent or sometimes thinly sericeous proximally on and near midrib and veins, the lateral veins and reticulum more visible below than above. *Inflorescence* paniculate, often contracted, 19.5–26 cm long or more, primary branches 4–22, 0.2–13.5 cm long, secondary branches 2–14, 0.1–4 cm long, tertiary branches if present very reduced, accessory branches 0.3–4.7 cm or absent; terminal or axillary, erect to sub-erect, densely and persistently brown-sericeous, with the flowers borne ultimately in 4–6-flowered umbels, sometimes with another pair of umbels below; inflorescence bracts like leaves and abruptly reduced to 1.7–4.3 × 1.5–2 mm, triangular to lanceolate, the margins entire or sometimes bearing short cilia, biglandular at base, the glands 1.2–1.5 mm diam., bright green; peduncle absent; bracts 0.8–0.9 × 1.5–1.7 mm, rounded, eglandular, abaxially sericeous, adaxially glabrous; bracteoles like bracts but smaller; pedicel 8.5–10 × 1.5–2.5(–2.8) mm, slightly curved upward or sometimes straight in flower, densely brown-sericeous, gradually thickened distally. *Sepals* 1.8–2.5 × 1.8–2.4 mm, brown, triangular at apex, appressed against filaments in anthesis, abaxially densely sericeous, adaxially glabrous, eglandular or the anterior sepal eglandular and the lateral 4 biglandular, the glands 1.9–3 mm long, elliptic or occasionally orbicular. *Petals* exposed in the enlarging bud, vivid yellow lacking red, glabrous; lateral petals spreading, margins entire or slightly erose proximally, claw 2.5–3 mm long, limb 4.5–5.5 × 4.5–5 mm, strongly dorsally carinate with the keel 0.3–1 mm wide, slightly decurrent; posterior petal sub-erect, minutely glandular-thickened at margins, claw 3–3.3 mm long, limb 4–4.5 × ca. 4.2 mm, suborbicular, slightly carinate, margins revolute in anthesis. *Stamens* glabrous; filaments unequal, 3–4.2 × 0.2–0.9 mm, connate ca. ⅓ their length, the 2 opposite stamens posterior-lateral petals, 4–4.3 mm long, the longest stamen longest opposite anterior sepal, 4–4.2 mm long, the shortest stamen opposite posterior petal, 3–3.2 mm long, the other stamens 3.5–4 mm long; anthers 1.7–2 mm long, slightly unequal, erect to slightly reflexed in anthesis, connective not widened and equalling the locules, the proximal 2/3–4/5 dark red, the distal ⅕–⅓ pale yellow. *Ovary* 1.5–1.8 mm high, densely sericeous; styles 4–4.5 mm long, equalling or slightly exceeding the anthers, glabrous, all 3 dorsally apiculate at apex, with a flattened elliptic top and internal stigma; anterior style nearly straight, posterior styles somewhat lyrate. *Samara* brown at maturity, 45–48 mm long, borne obliquely, thinly seri-

ceous or tomentose to glabrate; dorsal wing 30–38 × 15–17 mm, the abaxial edge straight or curved upward; nut 6–8 mm diam., generally ovoid, smooth-sided, without lateral crests or winglets.

Distribution and habitat.—In the restinga, moist forests, and wet forests of the Atlantic coastal range or dry forests inland scattered in the cerrado and campos rupestres in the "Chapada diamantina," Bahia (Fig. 3). *Heteropterys imperata* usually reaches into the canopy, along forest borders, in advanced secondary forest or disturbed sites.

Etymology.—The specific epithet is derived from the Latin "imperatus" in allusion to its dominant occurrence when found together with *Heteropterys nordestina* (see comments below) in some places in Bahia.

Phenology.—Flowering from June to February and March (immature flowers); fruiting from April to June and August to November.

Additional specimens examined: BRAZIL. **Bahia**: unknown locality, [probably 1841] (fl), *Luschnath s.n.* (NY); Mun. Canavieiras, estrada a Ouricana, 26 Oct 1988 (fr), *Mattos-Silva et al. 2624* (CEPEC); Mun. Conde, Fazenda do Bu, 20 Mar 1996 (imm fl), *Jost & Ferreira 253* (CEPEC, HRB), 27 Apr 1995 (fl), *Jost & Bautista 97* (CEPEC, HRB), 1 Jun 1995 (fr), *M. C. Ferreira & Silva 725* (CEPEC, HRB), 25 Apr 1996 (fr), *Jost & Bautista 285* (CEPEC, HRB), 14 Jun 2000 (fr), *Amorim et al. 3450* (CEPEC, MICH, NY, SP); Mun. Entre Rios, estrada a Esplanada, 11°53′S, 38°02′W, Feb 2002 (fl), *Fiaschi et al. 979* (CEPEC, SPF); Mun. Ilhéus: Almada, Sep 1822 (fl), *Riedel s.n.* (K—2 sheets, P, US); Olivença, 14 Oct 1983 (fr), *M. P. M. de Lima et al. 17* (CEPEC, HRB, RB); 29 Jul 1993 (fl), *Jardim et al. 249* (CEPEC, MBM, MICH, NY, SP, US); Mun. Itacaré: 2 Sep 1970 (fl), *T. S. Santos 1068* (CEPEC); Marambaia, 20 Nov 1991 (fr), *Amorim et al. 397* (CEPEC, NY); 14°15′S, 39°16′W, 2 May 1993 (fr), *Thomas et al. 9782* (CEPEC, MBM, MICH, NY, SP); Taboquinhas, 14 Dec 1992 (imm fl), *Amorim et al. 881* (CEPEC, MICH, NY, SP); Mun. Maraú: estrada a Ubaitaba, 27 Feb 1980 (fl), *T. S. Santos et al. 3545* (CEPEC, MICH—2 sheets, SPF); 7 Aug 2001 (imm fl), *E. B. Santos et al. 321* (CEPEC, NY, RB); Fazenda Água Boa, 25 Aug 1979 (imm fl), *Mori 12757* (CEPEC, MICH); Saquaíra, 5 Sep 1999 (fr), *Carvalho et al. 6745* (CEPEC, MICH, NY); Mun. Nilo Peçanha, Itiúba, 20 Feb 1975 (fl), *T. S. Santos 2882* (CEPEC, SPF), 22 Sep 1988 (fl), *Mattos-Silva et al. 2580* (ALCB, CEPEC, HUEFS, MBM); Mun. Palmeiras, Morro do Pai Inácio, 12°27′S, 41°28′W: 25 Sep 1994 (fl), *PCD 764* (ALCB, HRB, CEPEC, SP), 25 Oct 1994 (fl), *PCD 943* (ALCB, CEPEC, SP), 25 Oct 1994 (fr), *PCD 956* (ALCB, HUEFS, CEPEC), 26 Jan 2000 (st), *Jardim et al. 2530* (CEPEC); Mun. Santa Terezinha, Serra da Jibóia, 12°51′S, 39°28′W, 27 Sep 2000 (imm fl), *Queiroz et al. 6372* (HUEFS), 11 Jun 2000 (st), *Amorim et al. 3437* (CEPEC); Mun. Una, estrada a Olivença, 2 Sep 1971 (fl), *Pinheiro 1557* (CEPEC, MICH), 1 Jun 1981 (imm fl), *Hage & Santos 782* (CEPEC, MBM, MICH); Estação EMBRAPA, 16 Sep 1993 (fl), *Jardim et al. 305* (CEPEC, HRB, MBM, MICH, NY, SP, US); REBIO Una, 15°09′S, 39°05′W: 14 Sep 1993 (fl), *Amorim 1398* (CEPEC, MBM, MICH, NY), 28 Nov 1993 (fl), *Amorim et al. 1580* (CEPEC), 26 Aug 1994 (fl), *Jardim et al. 553* (CEPEC, NY, SP), 18 Oct 1994 (fr), *Jardim et al. 579* (CEPEC, NY, SP); Fazenda Juerana, 11 Aug 1999 (fr), *Mattos-Silva et al. 4016* (ALCB, HUEFS, HUESC), 22 Jul 1992 (fl), *Mattos-Silva et al. 3839* (CEPEC, HUEFS); Mun. Uruçuca, estrada a Serra Grande, 26 Jul 1979 (imm fl), *V. L. Gomes et al. 100* (RB), 26 Jul 1979 (imm fl), *Martinelli 6042* (CEPEC, RB); Parque Estadual da Serra do Condurú, 29 Sep 1999 (imm fl), *Amorim et al. 3128* (CEPEC, MBM, MICH, NY, SP), 4 Jun 2000 (fl), *Amorim et al. 3413* (CEPEC).

Heteropterys imperata, although collected relatively frequently, has not been recognized for a long time, having been confused previously with *H. anomala* (=*H. patens*). The principal floral difference between the two species is the coloration of petals: all petals of *H. imperata* are vivid yellow lacking red (vs. all petals orange suffused with red). Furthermore, the petiole of *H. imperata* is much shorter (10–22 mm long); the inflorescence is often strongly contracted; the flowers are borne ultimately in congested, dense umbels; and the samaras are much smaller, 45–48 mm long (vs. petiole 16–45 mm long, inflorescence spreading, the flowers borne ultimately in lax umbels, and the samaras 52–77 mm long).

I originally intended to describe *Heteropterys imperata* and the following (*H. nordestina*) as a single, polymorphic, and widespread species. However, during my observations of many populations in northeastern Brazil, especially in southern Bahia, differences in the arrangement of the inflorescence, size of the flowers (see Table 1), and microhabitat were detected for each. *Heteropterys imperata* usually occurs where sunlight is more abundant and on sandy soils and latisols, whereas *H. nordestina* occurs preferentially in forest shade and usually on podzols, except for some populations in sandy areas.

Two groups of specimens stand out

among those assigned to this species. In plants from the vicinity of Itacaré and Maraú (*Amorim 881, Thomas 9782, T. S. Santos 2882,* and *T. S. Santos 3545*), the petiole is strongly thickened, the leaves are coriaceous with broad laminas (ca. 2 times as long as broad), cordate or partially rounded, concealing the petiole; the secondary veins are usually flat; and the reticulum is inconspicuous. The abaxial edge of the dorsal wing of the samara is curved upward. Another isolated population known only from a small area near the "Chapada diamantina" (the central highlands of Bahia) differs from all other specimens in having a strongly reduced androecium. Specimens from this area are few and incomplete (*PCD 764, PCD 943, PCD 956,* and *Jardim et al. 2530*) and more representative collections are necessary to confirm these differences. Further study might show that these specimens represent taxa distinct from *Heteropterys imperata*, but such a determination will require better collections than are presently available.

Many species of *Heteropterys* have been recognized as difficult complexes (e.g., *H. oblongifolia* Gleason, *H. pteropetala* A. Juss., *H. syringifolia* Griseb., and *H. trichanthera* A. Juss.). I believe that satisfactory resolution of the taxonomy of these groups requires extensive fieldwork, analyses of specimens, and interpretation of the phenotypic plasticity of some characters. In this case, the differences in floral structure between *H. imperata* and *H. nordestina* warrant the recognition of these taxa at the rank of species. The variation in the size and shape of the flowers is discontinuous, subtle differences in the flowering phenology exist, and, although both species are sympatric in a few places in coastal Bahia, each has a strong preference for distinct microhabitats.

Heteropterys nordestina Amorim, sp. nov. (Figs. 1, 5)

TYPE. BRAZIL. [Bahia:] In Brasilia circa Bahia, 1839 (fl imm fr), *Blanchet 2089* (HOLOTYPE: P, photo MICH; ISOTYPES: BM, G, MICH, photos of isotype at BM, CEPEC, MICH).

Liana basi ramis teretibus, sulcatis, aplanatis vel trilobis. Lamina foliorum majorum 5–20.5 cm longa, 4–13 cm lata, elliptica, ovata, obovata, orbiculata, ovato-lanceolata, obovato-oblonga, cuneato-oblonga vel late lanceolata, raro obcordata, utrinque glabrata; petiolus 5–21 mm longus, basi biglandulifer. Panicula patentia vel contracta, 15–35 cm longa, in ramis deflexis, umbellis 4–6-floris, pedunculo florifero nullo, pedicello 3.5–8.5 longo, 0.9–1.9 mm diametro, leviter incrassato versus apicem. Petala lutea, in alabastro exposita, patentia, dorsaliter carinata, limbo rectangulato vel basi truncato, plano vel concavo; filamenta heteromorpha; styli recti vel lyrati, apice dorsaliter apiculati vel truncati. Samarae 37–43 mm longae, nuce lateraliter laevi.

Liana climbing to 1.5–15 m or forming a small shrub when nothing is available to climb on; stems at base 1–2 cm diam., the cross-section cylindrical, irregularly sulcate, flattened, or occasionally divided into 3 or more lobes, twisted, glabrate, developing small scattered lenticels. *Leaves* mostly plane, eventually erect in inflorescence, opposite, spreading; petiole (5–)11–21 mm long, initially sericeous and soon glabrate, bearing a pair of glands at base, each gland 1.2–1.6 mm diam.; stipules 0.2–0.3 mm long, seldom evident, borne on the base of the petiole, generally absent from old leaves; lamina of larger leaves (5–)6.1–15.8(–20.5) × (4–)5–9(–13) cm, membranous to subcoriaceous, elliptic, ovate, obovate, orbicular, ovate-lanceolate, obovate-oblong, cuneate-oblong or widely lanceolate, rarely obcordate, obtuse to rounded, rarely acute at base, acute, rounded, shortly caudate or cuspidate, rarely retuse at apex, the margins entire or rarely irregularly dentate, bearing many small bordered glands and short cilia, especially in young leaves, glabrous or initially sparsely sericeous (with short, appressed, medifixed hairs) and soon glabrescent or rarely with a persistent sericeous-indument abaxially, the lateral veins slightly prominent below, reticulum very fine and more visible below than above. *Inflorescence* paniculate, spreading or sometimes contracted, 15–35 cm long, terminal or axillary, erect or more frequently pendulous, densely and persistently brown-sericeous, with the flowers borne ultimately in 4–6-flowered umbels; inflorescence bracts like leaves and gradually or abruptly reduced to 1.8–5 × 0.6–1.6 mm, lanceolate or triangular, the margins entire, eglandular or biglandular at base, the

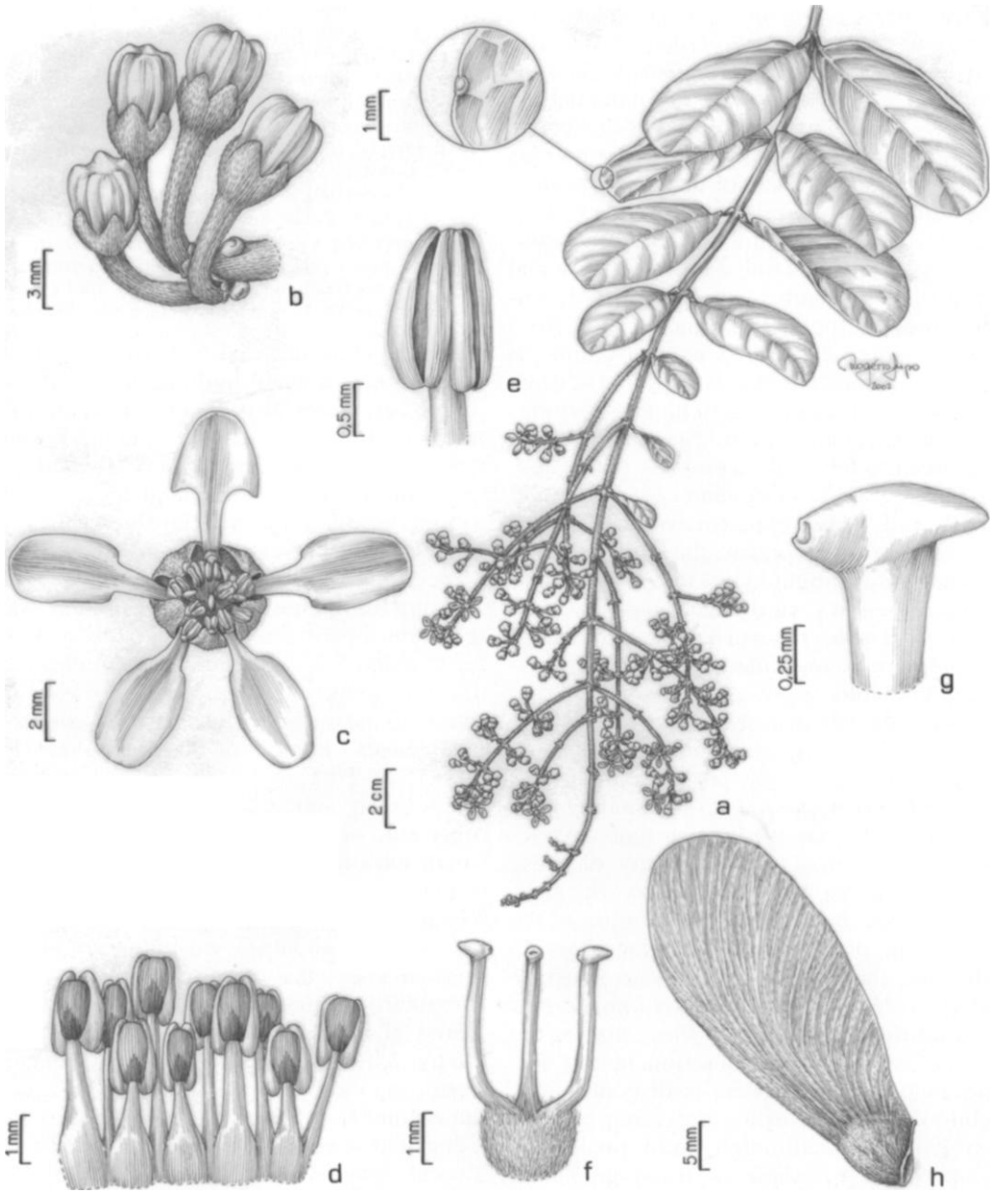

FIG. 5. *Heteropterys nordestina*. **A**. Flowering branch with enlarged abaxial view of leaf margin. **B**. Umbel of flower buds. **C**. Flower, from above. **D**. Androecium, laid out, abaxial view, the stamen second from right opposite the posterior petal, stamen fourth from left opposite the anterior sepal. **E**. Detail of one anther, adaxial view. **F**. Gynoecium, anterior style in middle. **G**. Detail of apex of posterior style. **H**. Samara. (a–g from *Amorim et al. 3474*, CEPEC; h from *Sant'Ana et al. 618*, CEPEC.)

glands 0.6–1.5 mm diam., bright green; peduncle absent; bracts 0.7–1 × 0.8–1.3 mm, ovate or rounded, eglandular or sometimes biglandular, each gland ca. 0.9 mm diam., abaxially sericeous, adaxially glabrous; bracteoles similar to bract but smaller; pedicel (3.5–)5.2–8.5 × 0.9–1.9 mm (ca. 10 × 1.2–2.7 mm in fruit), brown-sericeous, slightly thickened distally, straight or curved. *Sepals* 1.3–1.5 × 1.4–1.8 mm,

brown, obtuse or rounded at apex, appressed against filaments in anthesis (principally 2 posterior sepals), abaxially brown-sericeous, adaxially glabrous, eglandular or the anterior sepal eglandular and the lateral 4 biglandular, the glands 1.7–2.4 mm long, elliptic. *Petals* exposed in the enlarging bud, yellow lacking red, glabrous; lateral petals spreading, margins proximally erose to rarely slightly denticulate, sometimes revolute in anthesis, claw 2–2.8(–3) mm long, limb 3.5–4.2(–4.8) × 2.1–3.8(–4.5) mm, ovate, irregularly rectangular, sometimes truncate at the base, flat to deeply concave, membranous, slightly thickened in center of limb, or sometimes strongly carinate; posterior petal sub-erect, glandular-thickened at margins, claw 3–3.7 mm long, limb 2.5–3(–4) × (2.4–)3.1–3.3 mm, ovate and often truncate at the base, narrowly flat, thickened in center of limb but not carinate. *Stamens* glabrous; filaments heteromorphic, 2–3.5 × 0.2–0.9 mm, connate ⅓–½ their length, the 2 stamens opposite posterior-lateral petals, 2.9–3.5 mm long, the longest stamen opposite anterior sepal, 2.7–3(–3.4) mm long, the shortest stamen opposite posterior petal, 2–2.5 mm long, the other stamens 2.5–3 mm long; anthers 1–1.8(–2.3) mm long, all alike or slightly unequal, reflexed or erect in anthesis, connective with proximal ⅔–⅘ dark red, the distal ⅕–⅓ pale yellow. *Ovary* 1.3–1.7 mm high, sericeous; styles 2.9–3.3 mm long, exceeding the anthers, glabrous, all 3 with a slightly flattened-elliptic top, the stigma internal; anterior and posterior styles nearly straight or sometimes somewhat lyrate, dorsally apiculate or truncate at apex, with all 3 facing toward posterior petal. *Samara* pale brown at maturity, 37–43 mm long, borne erect when single, obliquely or eventually horizontally when 2 or 3 develop, thinly sericeous to glabrate; dorsal wing 32–38 × 14–18 mm (sometimes much flared distally to produce a flabellate shape), the abaxial edge straight proximally; nut 4–7 mm diam., subspheroidal, smooth-sided, without lateral crests or winglets.

Distribution and habitat.—Known from northeastern Brazil (Fig. 3) between Rio Grande do Norte to the coast of Espírito Santo, where it occurs widely in all types of restinga (open, flooded, and forest), wet forests (lowland, montane, and tabuleiro), and moist forests (mesophyllous and semideciduous) between 5 and 600 m. *Heteropterys nordestina* is usually a liana growing in the forest canopy, but it is a small shrub in open areas (e.g., in open restinga in Espírito Santo and extreme southern Bahia). In some places in Bahia it can be found in forest remnants near cocoa plantations, whereas in Pernambuco and Alagoas it is found in forest remnants near sugar cane plantations.

Phenology.—Immature flowering specimens have been collected in January and February; flowering occurs primarily from March to July or sometimes until September; fruiting from May to November.

Etymology.—The specific epithet refers to northeastern Brazil, where it is abundant.

Representative specimens examined. BRAZIL. **Alagoas**: Mun. Barra de São Miguel, 9°53′S, 35°55′W, 17 Jun 2000 (fl), *Amorim et al. 3474* (CEPEC, K, MAC, MBM, MBML, MICH, NY, RB, SP); Mun. Maceió, Paripueira, 16 Aug 1983 (fr), *Sarmento et al. 685* (HRB); Mun. Marechal Deodoro, APA Santa Rita, 7 Aug 1987 (fr), *Esteves & Moreira 2000* (MAC, RBR, SP); Mun. Murici, 9°14′S, 35°52′W, 16 Mar 2000 (fl), *Carvalho et al. 7145* (CEPEC, NY); Mun. Pilar, Fazenda Lamarão, 18 Jun 2000 (fl), *Amorim et al. 3538* (CEPEC, K, MAC, MBM, MICH, NY, SP). **Bahia**: unknown locality, s.d. (imm fr), *Blanchet 37* (BM, P); Mun. Ibirapitanga, 18 May 1966 (fl), *Belém & Pinheiro 2257* (CEPEC, F, IAN, NY); Mun. Ilhéus, 14°58′S, 39°02′W, 14 May 1995 (fr), *Thomas & Kallunki 10909* (CEPEC, NY); Retiro, 14 Jun 1944 (fl), *Velloso 985* (R); Rio do Braço, 8 Aug 1972 (fr), *Pinheiro 1883* (CEPEC); São Pedro, 27 May 1944 (fl), *Velloso 928* (R); Mun. Itacaré: estrada a Ubaitaba, 17 Apr 1970 (fl), *T. S. Santos 741* (CEPEC); Marambaia, 14°24′S, 39°16′W, 2 May 1993 (fl), *Thomas et al. 9764* (CEPEC, HUEFS, MBM, MICH, NY); Mun. Jussari, RPPN Serra do Teimoso, 15°09′S, 39°31′W, 21 Apr 1999 (fl), *Amorim et al. 2883* (CEPEC, HUESC, MICH, NY, RB, SP); Mun. Porto Seguro, estrada a Eunápolis, 5 Oct 1972 (fl), *Eupunino 299* (CEPEC, MICH); Frei Calixto, 12 Aug 1995 (fl), *Hatschbach & Motta 63283* (CEPEC, MBM, MICH); PARNA Monte Pascoal, 13 Sep 1998 (fr), *Amorim et al. 2537* (CEPEC, MICH, SP); Reserva BRALANDA, 16°27′S, 39°19′W, 7 Apr 1994 (imm fl), *Jardim et al. 388* (CEPEC); Mun. Prado, Cumuruxatiba, 17°08′S, 39°25′W, 20 Oct 1993 (fr), *Thomas 10013* (CEPEC, HUEFS, MBM, MBML, MICH, NY, SP, US); Mun. Salvador, Lagoa de Abaeté, 22 May 1981 (fr), *Mori et al. 14037* (CEPEC, MICH); Mun. Santa Cruz de Cabrália, Reserva ESPAB, 16°23′S, 39°08′W, 29 May 1985 (fl), *F. S. Santos 486* (CEPEC, HRCB, HRB, HUEFS, MBM, SP, UEC); Mun. Una, Ecoparque de Una, 30 Apr 2000

(fl), *Sant'Ana et al. 801* (CEPEC, NY, SP); REBIO Una, 15°09′S, 39°05′W, 15 Jul 1993 (imm fl), *Jardim 213* (CEPEC, MBML, NY), 25 Jul 1996 (fr), *Sant'Ana et al. 618* (CEPEC, MICH, SP); km 38 a Ilhéus, 18 Oct 1994 (fr), *Jardim et al. 572* (CEPEC, SP); Mun. Uruçuca, Reserva Gregório Bondar, 14°59′S, 39°16′W, 20 May 1994 (fl), *Thomas et al. 10444* (CEPEC, MICH, NY, SP); Serra Grande, Conjunto Fazenda Santa Cruz, 14°25′S, 39°01′W, 1–12 Jul 1991 (fr), *Carvalho et al. 3394* (CEPEC, MICH, NY, SP). **Espírito Santo**: Mun. Conceição da Barra, Itaúnas, 24 Aug 1987 (fl), *Hatschbach & Cervi 51424* (CEPEC, INPA, K, MBM, MICH, US); Mun. Guarapari, APA Setiba, 29 May 2000 (fl), *Amorim et al. 3389* (CEPEC, G, K, MBM, MICH, MO, NY, RB, SP, VIES); Mun. Linhares, Reserva Cia. Vale do Rio Doce, 22 May 1972 (fl), *Lino 44* (RB, SP), 2 May 2001 (fl), *Folli 3908* (CVRD, MICH); Mun. Marechal Floriano, Sítio Bressan Domingos, s.d. (fl), *O. J. Pereira et al. 1621* (SP, VIES); Mun. Vila Velha, Barra do Jucu, 27 Jun 1982 (fl), *Weinberg s.n.* (R 184528). **Paraíba**: Mun. João Pessoa, 15 Nov 1979 (fr), *Agra 269* (JPB); Campus da UFPB, 07°08′S, 34°50′W, 21 Jun 2000 (fl), *Amorim et al. 3539* (CEPEC, JPB, K, MBM, MBML, MICH, NY, RB, SP). **Pernambuco**: unknown locality, s.d. (fl), *Pickel 939* (IPA, SP); Mun. São Vicente Férrer, 07°35′S, 35°30′W, 17 Mar 2000 (imm fl), *Ferraz & Melo 857* (MICH, PEUFR). **Rio Grande do Norte**: Mun. Baía Formosa, Engenho Estrela, 5 Jul 1959 (fl), *Mello-Filho 1716* (R). **Sergipe**: unknown locality, 19 Jun 1987 (fr), *Viana 1798* (ASE); Mun. Areia Branca, Serra de Itabaiana, 13 Mar 1984 (fl), *Viana 873* (ASE), 16 Jun 2000 (fr), *Amorim et al. 3470* (ASE, CEPEC, K, MAC, MBM, MICH, NY, RB, SP).

Heteropterys nordestina is distinguished by its generally spreading inflorescence, small flowers, and yellow petals lacking any red. This species is very similar to *H. imperata* vegetatively, but its flowers are dramatically different in size and general shape (see key, Table 1, and comments for *H. imperata*). It is the most widely distributed and most variable of the species in the anomalous-stemmed complex. The following patterns of variation can be seen: plants from sandy areas are small shrubs and usually have ovate or ovate-lanceolate lamina and erect inflorescences; plants from flooded restinga have lamina of the larger leaves to 20.5 cm long with margins sometimes dentate (e.g., *Jardim 572*); plants from wet or moist forests are usually vines and have orbicular, ovate-lanceolate or obovate-oblong lamina and pendulous inflorescences; some collections (e.g., *Jardim 213*) have a distinctive indument, with the lamina of larger leaves densely sericeous abaxially; the majority of specimens from Rio Grande do Norte, Pernambuco, and Alagoas have the strongly carinate lateral petals, the limb irregularly rectangular and deeply concave, and short often glabrate samara; and in some populations from Bahia, the samara shows a flabellate shape (about as wide as long).

The assemblages of populations that show these morphological and ecological traits most clearly could qualify as ecological subspecies, but no reliable characters distinguishing these groups have been observed. Therefore, I choose not to give any of them formal taxonomic status at this time. Furthermore, several collections might represent hybrids between *Heteropterys nordestina* and possibly the sympatric *H. oberdanii* (in coastal Espírito Santo) or *H. imperata* (in coastal Bahia).

Heteropterys patens (Griseb.) A. Juss., Arch. Mus. Hist. Nat. 3: 437. 1843.

Banisteria patens Griseb., Linnaea 13: 200. 1839. TYPE. BRAZIL. São Paulo: s.d. (fl), *Sellow IV. it. 5823* (HOLOTYPE: B, destroyed, photos: A, CEPEC, F, IAN, MICH, MO, NY, SP, US; fragment of holotype (flowers in the packet): P–JU; ISOTYPE: NY). (Fig. 6).

Heteropterys anomala A. Juss., Ann. Sci. Nat. Bot., sér. 2, 13: 273. 1840. *Heteropterys anomala* f. *eglandulosa* Nied., Pflanzenr. IV, 141: 357. 1928, nom. superfl. TYPE. BRAZIL. [Rio de Janeiro:] Brésil méridional, Serra dos Órgãos, May 1839 (fl), *Guillemin 996* (LECTOTYPE designated by Cuatrecasas, 1958: P, photos: MICH, CEPEC, SP; ISOLECTOTYPES: G, P–JU p.p., photo of isolectotype at P: CEPEC, F, GH, MICH, MO, SP).

Heteropterys patens var. *acuminata* Nied., Pflanzenr. IV, 141: 356. 1928. TYPE: BRAZIL. São Paulo: descida da Serra Velha, 8 May 1923 (fl), *Gehrt s.n.* (**LECTOTYPE, here designated**: SP 8371; ISOLECTOTYPES: GH, NY).

Heteropterys anomala f. *glandulifera* Nied., Pflanzenr. IV, 141: 357. 1928. TYPE: BRAZIL. [Rio de Janeiro: Mun. Nova Iguaçu, REBIO Tinguá], Rio D'Ouro, 21 Feb 1879 (imm fl), *Glaziou 10369* (**LECTOTYPE, here designated**: P; ISOLECTOTYPES: K, R).

Liana, climbing to 1.5–4(–10) m; stems at base 1–3 cm diam., the cross-section usually strongly flattened, triangular, or deeply divided into 3 or more lobes, twisted, glabrate, developing small scattered lenticels. *Leaves* mostly plane, opposite, spreading; petiole 16–39(–45) mm long, initially densely sericeous and soon glabrate, bearing a pair of glands at base, each gland 1.2–

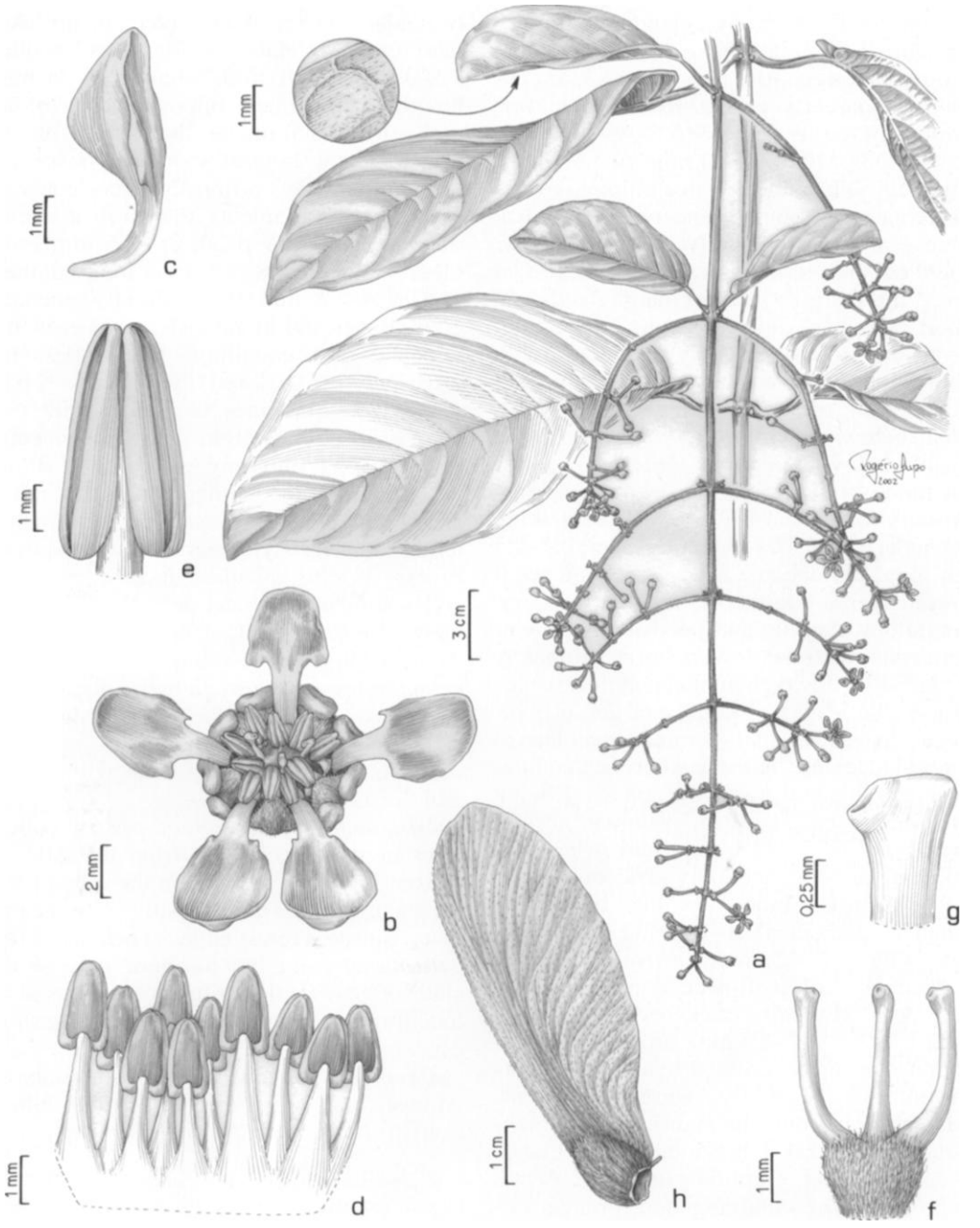

FIG. 6. *Heteropterys patens*. **A**. Flowering branch with enlarged abaxial view of leaf margin. **B**. Flower, from above. **C**. Lateral petal, lateral view. **D**. Androecium, laid out, abaxial view, the stamen second from right opposite the posterior petal, stamen fourth from left opposite the anterior sepal. **E**. Detail of one anther, adaxial view. **F**. Gynoecium, anterior style in middle. **G**. Detail of apex of posterior style. **H**. Samara. (a–g from *Amorim & Forzza 3383*, SP; h from *Silva 378*, RBR.)

1.6 mm diam. or rarely eglandular; stipules present on petiole, above base, as minute protuberances ca. 0.3 mm long, seldom evident, apparently absent from old leaves; lamina of larger leaves (6.5–)9–19.5(–23) × (4.5–)6.2–12.5(–16.5) cm, membranous, rounded, subrotund, ovate, elliptic, ovate-lanceolate, or oblong-lanceolate, rounded, obtuse, cuneate or rarely cordate at base, rounded and often apiculate to retuse at apex, the margins bearing many glands and short cilia, especially in young leaves, glabrous or initially sparsely sericeous (with short, appressed, medifixed hairs) and soon glabrescent, the lateral veins slightly prominent below, reticulum very fine and more visible below than above. *Inflorescence* paniculate, spreading, 23–35.5(–47) cm long, primary branches 4–22, 0.8–13 cm long, secondary branches 2–10 or absent, 0.5–2.5 cm long, tertiary and accessory branches if present very reduced; terminal or axillary, pendulous, densely and persistently brown-sericeous, with the flowers borne ultimately in lax 4–6-flowered umbels; inflorescence bracts like leaves, gradually or abruptly reduced to ca. 8 × 1.1–3 mm, lanceolate to linear-lanceolate, margins entire, eglandular or biglandular at base, the glands 1.8–2.2 mm diam., bright green; peduncle absent; bracts 1–1.6 × 2–2.1 mm, narrowly triangular, eglandular, abaxially sericeous, adaxially glabrous; bracteoles like bracts but smaller; pedicel 10.4–18 × 1.6–3.5 mm (ca. 11 × 2–4.5 mm in fruit), slightly curved upward in flower, densely brown-sericeous, gradually thickened distally. *Sepals* 1.7–2 × 2.2–2.5 mm, brown, obtuse or rounded at apex, pressed against filaments in anthesis, abaxially densely sericeous, adaxially glabrous, the anterior sepal eglandular, the lateral 4 biglandular, the glands 2–2.7 mm long, elliptic or orbicular. *Petals* exposed in the enlarging bud, orange suffused with red, the pigmentation evident in bud, glabrous; lateral petals spreading, margins entire or slightly erose and revolute in anthesis, claw 1.7–2.2 mm long, limb 3–3.2 × 3–3.2 mm, dorsally slightly carinate with the keel 0.3–0.6 mm wide, slightly decurrent; posterior petal sub-erect, minutely glandular-thickened at margins, claw 2.5–3 mm long, limb ca. 3 × 2.7–3.1 mm, suborbicular, thickened in center but not carinate. *Stamens* glabrous; filaments unequal, 2.5–3.6 × 0.2–1 mm, connate ca. ⅓ their length, the 2 stamens opposite posterior-lateral petals much thicker than others, ca. 3.3 mm long, the longest stamen opposite anterior sepal, ca. 3.6 mm long, not coherent with adjacent filaments, the shortest stamen opposite posterior petal, ca. 2.5 mm long, other stamens 2.8–3.2 mm long; anthers (1.5–)1.8–2.2 mm long, slightly unequal, erect to reflexed in anthesis, connective not widened and equalling the locules, the proximal ⅔–⅘ dark red, the distal ⅕–⅓ pale yellow or sometimes uniformly dark red. *Ovary* 1.5–2 mm high, densely sericeous; styles 3.3–3.6 mm long, equalling or slightly exceeding the anthers, glabrous, all 3 with a flattened elliptic top, with stigma internal; anterior style nearly straight, dorsally very briefly apiculate at apex; posterior styles somewhat lyrate, dorsally truncate at apex. *Samara* brown at maturity, (52–)67–77 mm long, borne obliquely, thinly sericeous or tomentose to glabrate; dorsal wing 40–63 × 22–30 mm, the abaxial edge nearly straight; nut 9–14 mm diam., subspheroidal or ovoid, smooth-sided, without lateral crests or winglets.

Distribution and habitat.—Most collections of this species are from the Atlantic coastal forests of the hills in the state of Rio de Janeiro (Fig. 3), principally from the primary forest or forest edges. There are a few collections from the northern part of the state of São Paulo (from nearby the same locality), where it is found in restinga forest.

Phenology.—Flowering from February to August, and November (only one collection); fruiting from April to November.

Representative specimens examined. BRAZIL. Unknown locality, s.d. (imm fl), *Claussen* [probably *2423*] (P). **Rio de Janeiro**: Serra dos Órgãos, Nov 1883 (fl), *Saldanha s.n.* (MICH, R 72295); Mun. Campo Grande, Serra do Mendanha, 4 Apr 1978 (imm fl), *Martinelli et al. 4130* (RB); Mun. Macaé, Pico do Frade, 19 Sep 1998 (fr), *Giordano et al. 2164* (CEPEC, RB, SP); Mun. Nova Friburgo, Alto Macaé, 15 Jun 1891 (fl), *Glaziou 18165* (G, NY, P); Reserva Ecológica de Macaé de Cima, 22°28′S, 42°30′W, 9 Mar 1989 (fl), *Lima 3489* (CEPEC, RB); Sítio São Jerônimo, 12 Aug 1995 (fr), *Pereira 204* (CEPEC, GUA); Mun. Nova Iguaçu, REBIO Tinguá, 10 Feb 1994 (fl), *Som-*

ner et al. 788 (CEPEC, RBR), 12 Aug 1995 (fr), *Silva 378* (CEPEC, RBR); Mun. Petrópolis, 8 May 1880 (imm fl), *Glaziou 11814* (K, P); Cachambú, 9 May 1876 (imm fl), *Glaziou 8299* (G, P); Mun. Rio de Janeiro, 9 Feb 1869 (imm fl), *Glaziou 2945* (K, P); Alto da Boa Vista, 5 Jun 1995 (fr), *Oliveira 1019* (CEPEC, GUA); Corcovado, 8 Feb 1869 (imm fl), *Glaziou 2944* (P); Mesa do Imperador, 13 Apr 1947 (fl), *E. Pereira 558* (RB); Morro Queimado, 19 Mar 1935 (fl), *Brade 14383* (RB); Parque da Cidade, 15 Aug 1972 (fr), *Occhioni 5203* (MICH, RFA); Pico da Tijuca, 18 Mar 1971 (fl), *Sucre 7520* (RB, SP); Mun. Rio das Ostras, REBIO União, 27 Sep 2000 (fr), *Braga 6316* (CEPEC); Mun. Teresópolis, Barreira, 28 May 1946 (fl), *E. Pereira 518* (HB); PARNA Serra dos Órgãos, 5 Jun 1950 (fl), *Pereira 432* (PNSO); Mun. Parati, APA Cairuçu, 12 Apr 1994 (fl), *Marquete 1582* (RB). **São Paulo**: unknown locality, 1917 (imm fl), *Frazão s.n.* (RB 11674); Mun. Picinguaba, Casa da Farinha, 9 Apr 1988 (fl), *Furlan et al. 416* (CEPEC, HRCB, SP), 6 May 2000 (fl), *Amorim & Forzza 3383* (CEPEC, MBM, MICH, RB, SP); Mun. Ubatuba, Morro da Prainha, 2 May 1892 (fl), *Edwall s.n.* (SP 1804).

Heteropterys patens is distinctive in its orange petals suffused with red; the posterior petal is red in the center of the limb and the lateral petals are red near the claw, with the pigment evident in bud. Few species of *Heteropterys* subsect. *Aptychia* exhibit this coloration in all the petals (usually all petals have the same color or only the posterior petal has a color different from the lateral petals). This characteristic was noted on some sheets from recent collections from the state of Rio de Janeiro and São Paulo (e.g., *Furlan et al. 416*; *Somner et al. 788*), and was confirmed during my fieldwork, and it shows a geographic correlation. Therefore, I am treating some populations from northeastern Brazil (Rio Grande do Norte to coastal Espírito Santo) as distinct species (e.g., *H. imperata*, *H. nordestina*, and *H. oberdanii*), because the petals of these plants are always vivid yellow lacking red. Other differences are summarized in the key and Table 1.

Banisteria patens, the earliest name for a species of the anomalous-stemmed complex, was based on a Sellow specimen from São Paulo. When Jussieu described *Heteropterys anomala*, he had three collections (one from Rio de Janeiro and two others from Bahia, see comments for *H. imperata* and *H. nordestina*), and was unaware that the earlier name *Banisteria patens* applied to his new species. Jussieu (1843) made the combination *H. patens*, but considered it a probably distinct species, because Sellow's type had an eglandular petiole, only short and oblong-lanceolate leaves, and immature flowers. Grisebach (1858) and Niedenzu (1903) followed Jussieu's taxonomic concepts; Niedenzu (1928) established *H. patens* var. *acuminata* (here considered a synonym). Although the occurrence of individuals with eglandular petioles is not common in this group, this character alone is not taxonomically significant. Having studied the types, especially the fragment of *H. patens* from the Berlin (B), now at NY, and having confirmed through recent collections the high variability in the shape of the leaves, I see no basis for separating *H. patens* from *H. anomala*.

Acknowledgments

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List of Exsiccatae

The numbers in parentheses refer to the taxa as they appear in the text.

H. admirabilis Amorim (1)
H. imperata Amorim (2)
H. nordestina Amorim (3)
H. patens (Griseb.) A. Juss.(4)
Agra, M. F. 269, 291 (3).
Amorim, A. M. 1398 (2).
Amorim, A. M. & R. C. Forzza 3383 (4).
Amorim, A. M. & J. C. Oliveira 3216 (4).
Amorim, A. M. & S. C. Sant'Ana 3433 (3).
Amorim, A. M. et al. 359 (3); 397, 881 (2); 1302 (3); 1580 (2); 2199, 2505, 2537, 2883 (3); 3128 (2); 3229 (3); 3316, 3339 (1); 3348, 3389 (3); 3413, 3437 (2); 3448 (3); 3450 (2); 3470, 3474, 3538, 3539 (3).
Araujo, S. & E. Pereira 518 (4).
Barros, F. 2466 (3).
Belém, R. P. & R. S. Pinheiro 2257 (3).
Blanchet, J. S. 37, 2089 (3).
Brade, A. C. 14383 (4).
Braga, J. M. A. 6316 (4).
Brito, M. J. 1 (3).
Carvalho, A. M. et al. 3394 (3); 3559 (2); 6205 (3); 6745 (2); 7145 (3).
Claussen, P. [probably 2423] (4).
Costa, C. B. et al. 328 (3).
Duarte, A. P. 834 (4); 6679 (3).
Edwall, G. *s.n.* [SP 1804] (4).
Esteves, G. L. & P. Lyra-Lemos 2032 (3).
Esteves, G. L. & I. S. Moreira 2000 (3).
Eupunino, A. 268, 299 (3).
Farney, C. et al. 2421 (3).
Farias, G. L. 129 (3).
Fernandes, H. B. 2417 (1).
Ferraz, E. & J. I. M. Melo 857 (3).
Ferreira, M. C. & L. N. Silva 725 (2).
Fiaschi, P. et al. 979 (2).
Folli, D. A. 3908, 3920 (3).
Fonseca, M. & M. L. Guedes 1105 (3).
Frazão, A. *s.n.* [RB 11674] (4).
Furlan, A. et al. 416 (4).
Garcia, F. C. P. 135 (4).
Garcia, F. C. P. et al. 430 (4).
Gehrt, A. *s.n.* [SP 8371] (4).
Germano-Filho, P. 67 (4).
Glaziou, A. 2944, 2945, 8299, 10369, 11814, 18165 (4).

Giordano, L. C. et al. 2164 (4).
Goés, O. C. & D. Constantino 864 (4).
Gomes, V. L. et al. 100 (2).
Guillemin, J. B. A. 996 (4).
Hage, J. L. & E. B. dos Santos 782 (2).
Hatschbach, G. & A. Cervi 51424 (3).
Hatschbach, G. & J. T. Motta 63283 (3).
Hatschbach, G. & J. M. Silva 61419, 61604 (1).
Hatschbach, G. et al. 61181 (1).
Jardim, J. G. 106, 213 (3).
Jardim, J. G. & H. Lorenzi 1769 (3).
Jardim, J. G. et al. 249, 305 (2); 388 (3); 553 (2); 572 (3); 579, 2530 (2).
Jost, T. & H. P. Bautista 97, 285 (2).
Jost, T. & M. C. Ferreira 253 (2).
Kollmann, L. et al. 321, 423, 1079 (1).
Lima, H. C. 3489 (4).
Lima, M. P. M. et al. 17 (2).
Lino, A. M. 44 (3).
Luschnath, B. *s.n.* (2).
Lyra-Lemos, R. P. et al. 3909 (3).
Marquete, R. 1582, 1820 (4).
Martinelli, G. 6042 (2).
Martinelli, G. et al. 1890, 1965 (3); 4130 (4).
Mattos-Silva, L. A. et al. 2580, 2624, 3839, 4016 (2).
Maurício, J. & I. A. Bayma *s.n.* [MAC 6761] (3).
Mello-Filho, L. E. 1716 (3).
Mori, S. A. 11906 (3); 12757 (2); 14037 (3).
Mori, S. A. et al. 10326, 10374 (3).
Moura, O. T. 1099, 1347a (3).
Occhioni, P. *s.n.* [RFA 6501], 5203, 5722 (4).
Oliveira, C. A. L. 1019, 1270 (4).
PCD 764, 943, 956 (3).
Pereira, A. B. 432 (4).
Pereira, C. E. B. 204 (4).
Pereira, E. 518, 558 (4).
Pereira, O. J. et al. 1621 (3).
Peron, M. et al. 839 (4).
Pessoa, S. V. A. et al. 488 (4).
Pessoal do Horto Florestal *s.n.* [RB 26354] (4).
Pickel, B. 939, 3354 (3).
Pinheiro, R. S. 1557 (2); 1883 (3).
Queiroz, L. P. et al. 6372 (2).
Ribeiro, J. E. L. S. et al. 506, 755 (4).
Riedel, L. *s.n.* (2).
Rosa, L. V. et al. 113 (3).
Saldanha, J. *s.n.* [R 72295] (4).
Sant'Ana, S. C. et al. 618, 801, 872, 932 (3).
Santos, E. B. et al. 321 (2).
Santos, F. S. 486 (3).
Santos, T. S. 741 (3); 1068, 2882 (2).
Santos, T. S. et al. 3545 (2).
Sarmento, A. et al. 685 (3).
Sellow, F. IV. it. 5823 (4).
Silva, I. M. 378 (4).
Silva-Neto, S. J. 26 (4).
Simonelli, M. et al. 652 (3).
Somner, G. V. et al. 788 (4).
Sucre, D. 7520, 8512 (4).
Takahasi, A. & C. S. C. Bencke 132 (4).
Thomas, W. W. 10013 (3).
Thomas, W. W. & J. Kallunki 10909 (3).
Thomas, W. W. et al. 9764 (3); 9782 (2); 10444 (3).
Velloso, H. P. 928, 985 (3).
Viana, G. 873, 1798 (3).
Vieira, C. M. et al. 31 (4).
Weinberg, B. *s.n.* [R 184528], *s.n.* [MBML 6381], *s.n.* [MBML 6449] (3).