Chapter 1

A COMPARISON AMONG FOUR SPECIES OF AMARYLLIDACEAE

Amaryllidaceae is one of the scarcest and most attractive plant families of Colombia. It can be distinguished from other monocots in this region by the following combination of characteristics: they are terrestrial herbs, not climbing, usually not epiphytes, with a subterranean bulb, without a true aerial stem (but some *Crinum* have a pseudostem composed of leaf bases), leaves unarmed and not equitant, flowers bisexual and usually large and showy, tepals united at base forming a tube, stamens six, column absent, ovary inferior, and fruit a capsule.

In the department of Valle del Cauca, in southwestern Colombia, eight genera of the family Amaryllidaceae (x *Calicharis* Meerow, *Caliphruria* Herb., *Crinum* L., *Eucharis* Planch., *Hippeastrum* Herb., *Phaedranassa* Herb., *Plagiolirion* Baker, and *Zephyranthes* Herb.) exist or existed in a native state, with at least ten native species, all in danger of extinction because of the destruction of their habitat.

In this department, these species are found in the following regions: Cauca Valley and adjacent piedmont, tropical dry forest: *Eucharis bonplandii* (Kunth) Traub, *E. caucana* Meerow, *Hippeastrum puniceum* (Lam.) Kuntze, *Plagiolirion horsmannii* Baker; Cordilleras Occidental and Central, cloud forest: *Caliphruria subedentata* Baker, *Phaedranassa lehmannii* Regel, *Zephyranthes* carinata Herb.; Pacific coast (biogeographic Chocó region): x *Calicharis butcheri* (Traub) Meerow, *Crinum kunthianum* M. Roem., *Eucharis sanderi* Baker.

All of these species sometimes are cultivated. The species that are cultivated most frequently in Cali are *Eucharis* x *grandiflora* Planch. & Linden and *Hippeastrum puniceum*. *Eucharis* x *grandiflora* is a sterile hybrid propagated asexually. Only once have I seen a group of plants of

this species growing in a place distant from a house, in an abandoned coffee grove in Risaralda. This group might have been an abandoned remnant of cultivated plants. *Caliphruria subedentata* sometimes is cultivated, but does not flower in Cali. *Zephyranthes carinata* Herb., *Crinum* x *amabile* Donn, *C. jagus* (Thompson) Dandy, *C. kunthianum* M. Roem., *C.* x *powellii* hort. ex Baker, and *C. zeylanicum* (L.) L. also are cultivated in Cali. It is possible that *Hymenocallis* is cultivated here, but there are no reports of it.

Four of these species are included in this study. One of these, *Eucharis caucana*, was studied in the field during nine years; observations were also made on cultivated plants of this species. The other three, *E. bonplandii*, *E. sanderi*, and *Plagiolirion horsmannii*, were studied from plants cultivated by the author in Cali. A comparison of the characteristics of these four species is shown in Table 1.1.

All of these species are herbaceous understory geophytes that lack an aerial stem, have bulbs, and are perennial. All are protandrous and self-compatible. *Eucharis bonplandii*, *E. caucana*, and *P. horsmannii*, which live in tropical dry forest in the Cauca Valley, lose their leaves in the dry seasons (although at least in *E. caucana*, not all individuals in a population lose their leaves simultaneously). *E. sanderi*, unlike the other three species, inhabits wet tropical forest in the Pacific lowlands, in the Chocó biogeographic region; its leaf phenology has not been studied. All of these species are known from few records and are rare, because of the destruction of their habitat. *E. sanderi* is more widely distributed than the other three species, but in the long run, its habitat also will be destroyed.

The most distinctive of the four species is *Plagiolirion horsmannii* (Fig. 1.1), which is the only species of its genus and the only genus of angiosperms endemic to the Cauca Valley. It differs from all other species of Amaryllidaceae of southwestern Colombia in its small, zygomorphic perianth with a fanlike limb (Fig. 1.2a), the large number of flowers in the inflorescence, and its small fruits, usually with only one seed (sometimes two or three). It also is the rarest species. It was found originally by the German collector Carl Friedrich Lehmann in 1883 in the municipality of Roldanillo in the department of Valle del Cauca. It was not collected again for more than 100 years and was considered extinct by the IUCN (International Union for the Conservation of Nature), until its rediscovery at the northern end of the Cauca Valley in Risaralda on 3 June 1989 (Meerow & Silverstone-Sopkin, 1995). At present, it is known from three localities, but the main wild population is reduced to only ten individuals (Hilda Sanint, pers. com.).

Eucharis sanderi has the largest flowers (Fig. 1.2b), fruits, and seeds of these four species, and usually has only two flowers (the other three species usually have more than two flowers). The staminal cup (the united bases

of the filaments) is very reduced in this species (free only 1 mm), and the stamens are curved inward. The leaves (unlike the other three species) are strongly plicate (Fig. 1.3).

Eucharis bonplandii and *E. caucana* resemble each other. Both have orange fruits. In *E. bonplandii*, the leaves are dark green tinged bluish-gray, the flowers are smaller, the staminal cup is longer (it protrudes from the perianth, Fig. 1.2c), and has a pair of teeth on the border between each two filaments, and the fruits are narrower, with a wrinkled surface. In *E. caucana*, the leaves are dark green but are not tinged bluish-gray, the flowers are larger, the staminal cup is shorter (it does not protrude from the perianth, Fig. 1.2d) and lacks teeth, and the fruits are broader, with a smooth surface. Moreover, these two species differ in karyotype; *E. bonplandii* is tetraploid, and *E. caucana* is hexaploid (Meerow, 1989).

Key to the wild or cultivated genera of Amaryllidaceae that have been collected or may be found in the department of Valle del Cauca, Colombia

1a. Leaves less than 1 cm wide; flowers solitary . . . . *Zephyranthes*
1b. Leaves more than 2 cm wide; flowers 2 or more per inflorescence 2

2a (1b). Perianth pink, red-orange, red, or red and green 3
2b. Perianth white (sometimes partially tinged green and/or yellow, rarely tepals with midlongitudinal purple stripe and/or abaxial surface purple) 4

3a (2a). Perianth broadly infundibuliform, limb (measured between tips of outermost tepals in natural position) more than 6 cm diameter; stamens geniculate . . . *Hippeastrum*
3b. Perianth tubular, limb less than 3 cm diameter; stamens straight . . . . . *Phaedranassa*

4a (2b). Perianth tube 10 cm long or more. 5
4b. Perianth tube less than 8 cm long 6

5a (4a). Stamens free. . . . . *Crinum*
5b. Stamens connate at base, forming broad staminal cup . . . . . .*Hymenocallis*

6a (4b). Flowers zygomorphic (usually all 6 tepals at upper side of flower); usually more than 14 flowers per inflorescence; perianth tube less than 0.9 cm long . . . . . .*Plagiolirion*

6b. Flowers actinomorphic; fewer than 8 flowers per inflorescence; perianth tube more than 1.4 cm long 7

7a (6b). Perianth tube straight or almost straight; internal surface of staminal cup and perianth not tinged green and/or yellow . . . . . *Caliphruria*

7b. Perianth tube curved; internal surface of staminal cup and perianth partly tinged green and/or yellow, forming longitudinal stripes (nectar guides) . . . . . *Eucharis* (including hybrids)

Key to the species of *Eucharis* and its hybrids that are found in the department of Valle del Cauca, Colombia

1a. Border of staminal cup (united bases of filaments) with teeth between free parts of filaments 2

1b. Border of staminal cup without teeth between free parts of filaments 3

2a (1a). Plants wild, sometimes cultivated, fertile; leaves only slightly plicate, adaxial surface tinged bluish-gray; perianth tube less than 3.5 cm long; staminal cup strongly exserted; mature fruit bright orange, rugose . . . . . *Eucharis bonplandii*

2b. Plants cultivated, sterile hybrids between *E. moorei* and *E. sanderi*; leaves strongly plicate, adaxial surface green, not tinged bluish-gray; perianth tube more than 4 cm long; staminal cup only slightly exserted; fruit never produced . . . . . *Eucharis* x *grandiflora*

3a (1b). Leaves only slightly plicate; perianth tube dilated in distal one-third; mature fruit 1.3-1.5 cm long, broader than long, orange; seeds (7-) 10-12 mm long . . . *Eucharis caucana*

3b. Leaves strongly plicate; perianth tube dilated in distal one-half; mature fruit (when produced) 4-5.5 cm long, longer than broad, very pale dull orange to very pale brown; seeds (when produced) 12-21 mm long 4

4a (3b). Plants fertile; distal part of stamens strongly curved inward; mature fruit 4-5.5 cm long, very pale dull orange to very pale brown; seeds 12-21 mm long . . . *Eucharis sanderi*

4b. Plants sterile hybrids between *Caliphruria subedentata* and *Eucharis sanderi*; stamens straight or slightly curved; fruit and seeds not produced . . . . . x *Calicharis butcheri*