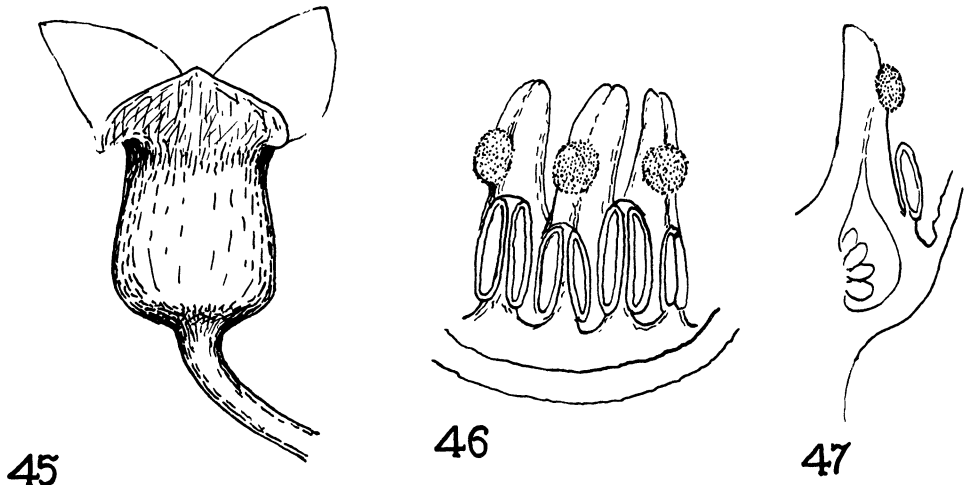


8. *Hexastylis contracta* Blomquist, sp. nov.⁵

Folia lato- vel orbiculari-cordata, ca. 6.5 cm longa, 5.5 cm lata, apicibus obtusis (raro acutis) vel retusis, sinibus latis vel angustis, non variegata. Calyces anguste vel late ampulliformes, 1.5-2.75 cm longi per axim, 1.2-1.7 cm per diametrum, conspicue super basim coarctati; extrinsecus super basim pallidi et subflavi, media parte hepaticolores, et superiore parte flavi des maculis purpureis notati; tubulus calycis intrinsecus hepaticolor, et infra parce rugoso-reticulatus; lobi calycis intrinsecus subflavi, maculis vel areolis subalbidis notati. Stamina sessilia, conjunctionibus antherarum in brevis appendices obtusos, 0.5 mm longos protractis. Ovarium ca. $\frac{1}{3}$ inferius. Styli ca. 3 mm longi, super stigma ca. 1 mm exserti, et in apice 0.5 mm divisi.

Leaf-blades broadly- to orbicular-cordate, averaging 6.5 cm long by 5.5 cm broad, the apices obtuse (rarely acute) to retuse, the sinuses broad to narrow with lobes sometimes overlapping over the petiole, scabridulous at the base on the



FIGS. 45-47. *Hexastylis naniflora*. FIG. 45. Calyx, $\times 5$. FIG. 46. Stamens and styles, $\times 13$. FIG. 47. Section of pistil showing degree of inferiority.

upper side of the principal veins, the margins revolute, even to wavy, not variegated. Petioles averaging 12 cm long, Rhizomes short and freely branching. Calyces broadly flask-shaped, 1.5-2.75 cm long by 1.2-1.7 cm wide, prominently contracted above the base, expanded above this, then gradually narrowing upward to the base of the slightly spreading, acute to obtuse lobes, colored on the outside pale yellow above the base, purplish about the middle, fading upward to pale yellow with purplish spots, on the inside the tube purplish-brown and sparingly ridged-reticulate below, the lobes yellowish inside with purplish spots or areas and short-pilose. Stamens essentially sessile, the anther-connective prolonged into a blunt appendage ca. 0.5 mm long. Ovary ca. one-third inferior. Styles ca. 3 mm long, extending 1 mm above the stigma, divided at the apex 0.5 mm. Seeds 2-5 per locule, 4 mm long. TYPE: *Godfrey & Anderson 51225* (DUKE) (figs. 6, 7, 17, 24, 39, 42).

⁵Grateful acknowledgement is due to Dr. Thomas M. Simkins, Jr. of the Duke University Library for preparing the Latin diagnosis.

Specimens examined: NORTH CAROLINA: Buncombe Co., *Kalmia-Rhododendron-Tsuga*, rocky ravine, tributary stream of Broad River, between Old Fort and Bat Cave, *Godfrey & Anderson 51225*, 4 June, 1951 (DUKE, NCS); *Blomquist & Channell 15441* (DUKE). TENNESSEE: Cumberland Co., 3 mi. n. e. of Crossville, *Bain 3580* (TENN); Fentress Co., Clarke Range, *Svenson 9017* (TENN); Van Buren Co., Cane Creek Falls, *Cain & Sharp 4322* (TENN); *Harger 7741* (TENN, US); Falls Creek Falls, *Meyer 1292* (TENN); Van Buren-Blesoe Co's near Group Camp, *Iltes 3385* (TENN).

On the basis of leaf-blade form, the presence of ridged reticulation inside the calyx-tube, and the shallow division of the style-extension above the stigma, this species falls in the *Virginica* group. The flask-shaped calyx resembles to some extent that of the *Arifolia* group. The shape of the calyx with ridged reticulation and the conspicuously contracted lower portion of the calyx are the most distinctive characteristics of this species. It is possible that it may have some relation to the *Arifolia* group, but, since there is no indication of intergradation in the population between this and the *Virginica* group, it must be considered a distinct species. The disjunct distribution is interesting and is undoubtedly real since a good deal of collecting has been done between the two distantly separated areas where it has been found. No explanation of this anomalous distribution is attempted at this time.

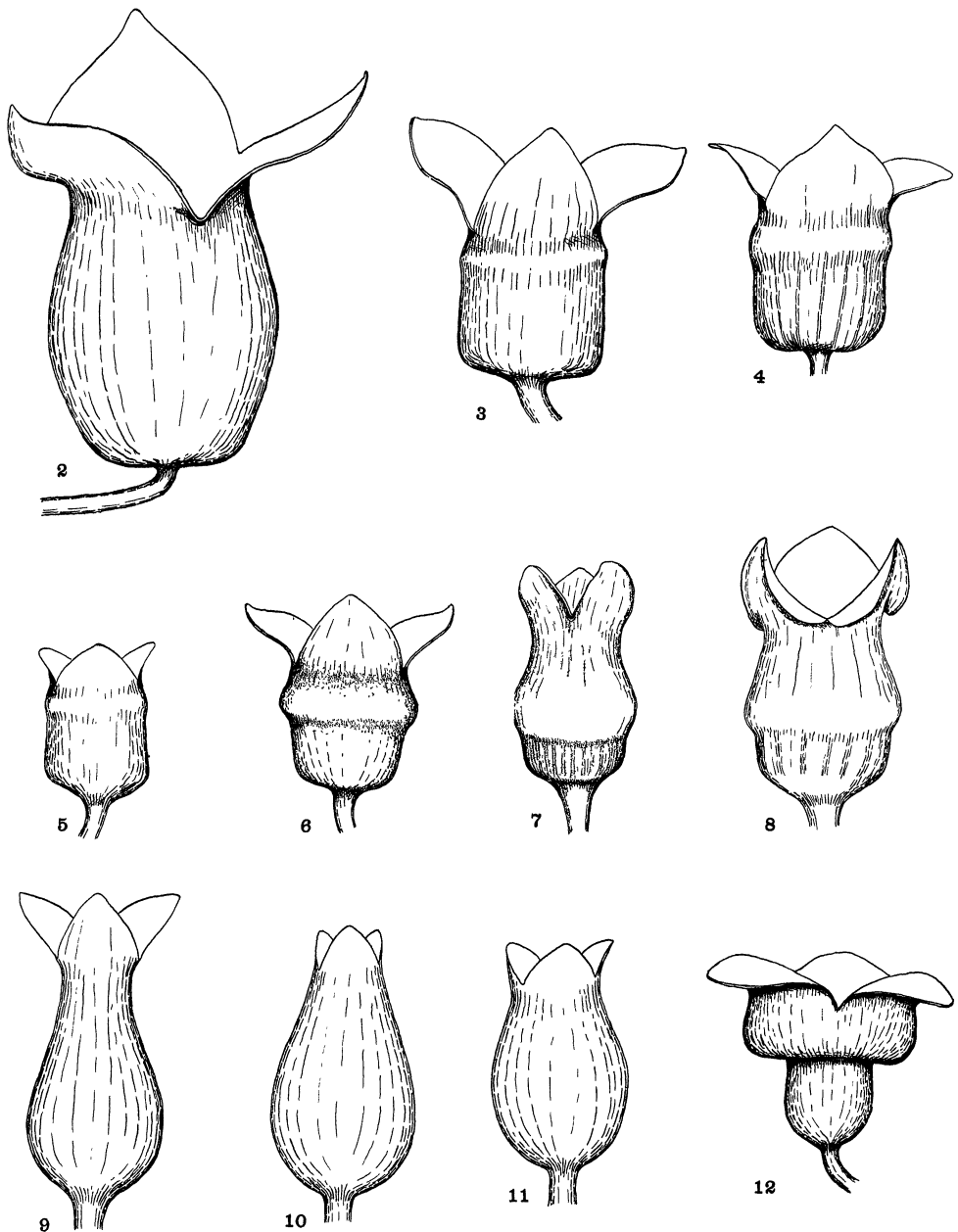
9. *Hexastylis naniflora* Blomquist, sp. nov.

Folia cordata vel orbiculari-cordata, ca. 4-5.75 cm longa 4-5.5 cm lata, apicibus obtusis, sinibus latis vel angustis, variegata. Calyces parvi, cylindrici, 1.2-1.3 cm longi per axim, 6-7 mm per diametrum, hepaticolores vel ad super hasim pallidi; lobi non maculati, 5.5 mm longi, 7 mm lati ad basim. Stamina sessilia, conjunctionibus antherarum in appendices non protractis, 1.61-1.84 mm longa. Ovarium ca. $\frac{1}{2}$ inferius. Styli ca. 2.5 mm longi. super stigma ca. 0.75 mm exserti, et in apices 0.25 mm divisi.

Leaf-blades cordate to orbicular-cordate, 4-5.75 cm long by 4-5.5 cm wide, the apices obtuse, the sinuses broad to narrow, the lobes rarely overlapping, usually variegated along the principal veins. Petioles averaging 10.5 cm long. Rhizomes short and moderately branching. Calyces relatively small, brown, the tube cylindric, slightly narrowing upward, 7 mm long by 6.5 mm in diameter, sometimes pale brown above the base, the lobes relatively large, flaring at the base, 7 mm wide at the base by 5.5 mm long, moderately spreading, without colorless spots inside. Stamens essentially sessile, those opposite the styles conspicuously shorter than the alternating ones, 1.61-1.84 mm long, the anther-connective not prolonged into an appendage. Ovary ca. $\frac{1}{2}$ inferior. Styles ca. 2.5 mm long, extending 0.75 mm above the stigma, only notched at the apex. Mature seeds not seen. TYPE: *Harry E. Ahles & C. R. Bell 11297* (DUKE: isotype, UNC) (figs. 44-47).

Specimens examined: SOUTH CAROLINA: Cherokee County, low woodland with *Osmunda*, 8.7 miles northwest of Gaffney on SC #11, *Harry E. Ahles & C. R. Bell 11297*, 22 April, 1956 (DUKE, UNC). NORTH CAROLINA: Cleveland County, with *Kalmia latifolia* on deciduous wooded slope of Brushy Creek about 3 miles south of Polkville, *Harry E. Ahles & C. R. Bell 11109*, 19 April, 1956.

The most outstanding characteristic of this recently discovered species is the small flowers, which are the smallest of any species in North America. The shape of the leaf-blades, their pattern of variegation, and the ridged reticulation inside the calyx-tube place this species in the *Virginica* group. It differs, however, from all the other members of this group, aside from the small size of flowers, in having no flare in the calyx-tube. In fact, instead of expanding upward, more or less, as in the majority of this group, the tube tends to be slightly narrower up-



FIGS. 2-12. Diagrammatic sketches of forms of calyces in *Hexastylis*. FIG. 2. *H. shuttleworthii*. FIG. 3. *H. heterophylla*. FIG. 4. *H. lewisii*. FIG. 5. *H. virginica*. FIG. 6. *H. minus*. FIGS. 7, 8. *H. contracta*. FIG. 9. *H. arifolia* var. *arifolia*. FIG. 10. *H. arifolia* var. *ruthii*. FIG. 11. *H. arifolia* var. *callifolia*. FIG. 12. *H. speciosa*.

Hexastylis. The only characters in which some of them may show some intergradation with *Asarum* are mainly vegetative, such as the evergreen vs. annual habit of leaves, one or more leaves borne on the same branch each season, and the extent of hairiness of leaves and the outside of the calyx. On the other hand,

TAXONOMIC TREATMENT

Since no formal, comprehensive description of *Hexastylis* has ever been published, the following will serve to distinguish the genus, at least as regards North American material (upon which it was originally based).

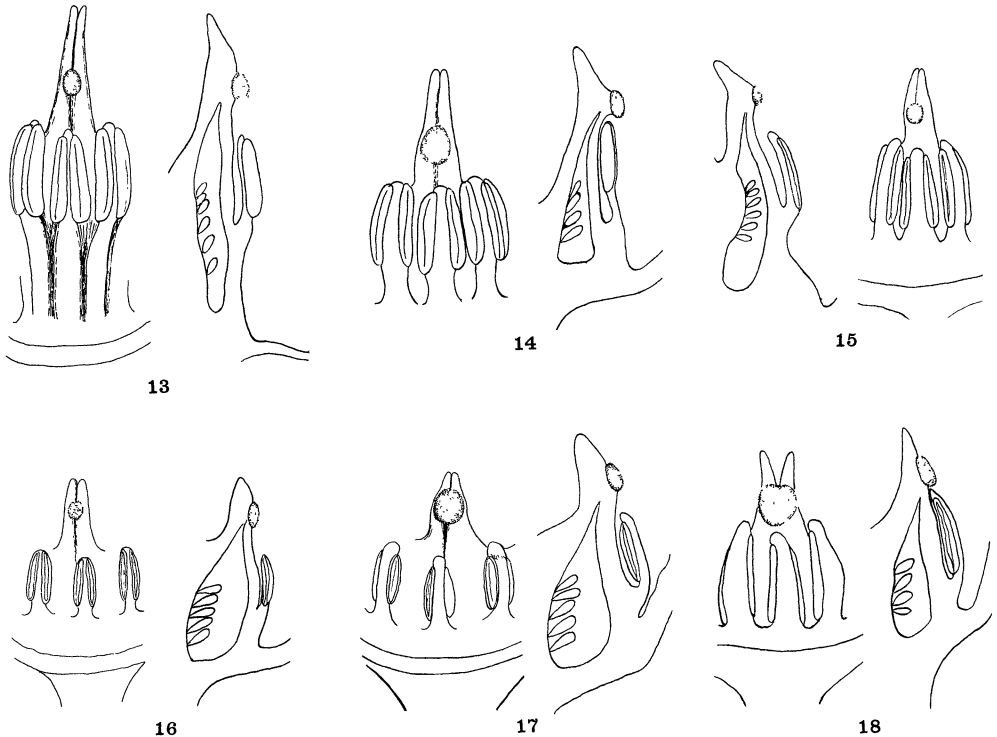
Hexastylis Raf. Neogenyton 3. 1825.

Asarum L. Gen. Pl. ed. 5. 201, pro parte. 1754.

Heterotropa Morr. & Decne. emend. A. Gray, Am. Jour. Sci. 42: 19 (footnote).

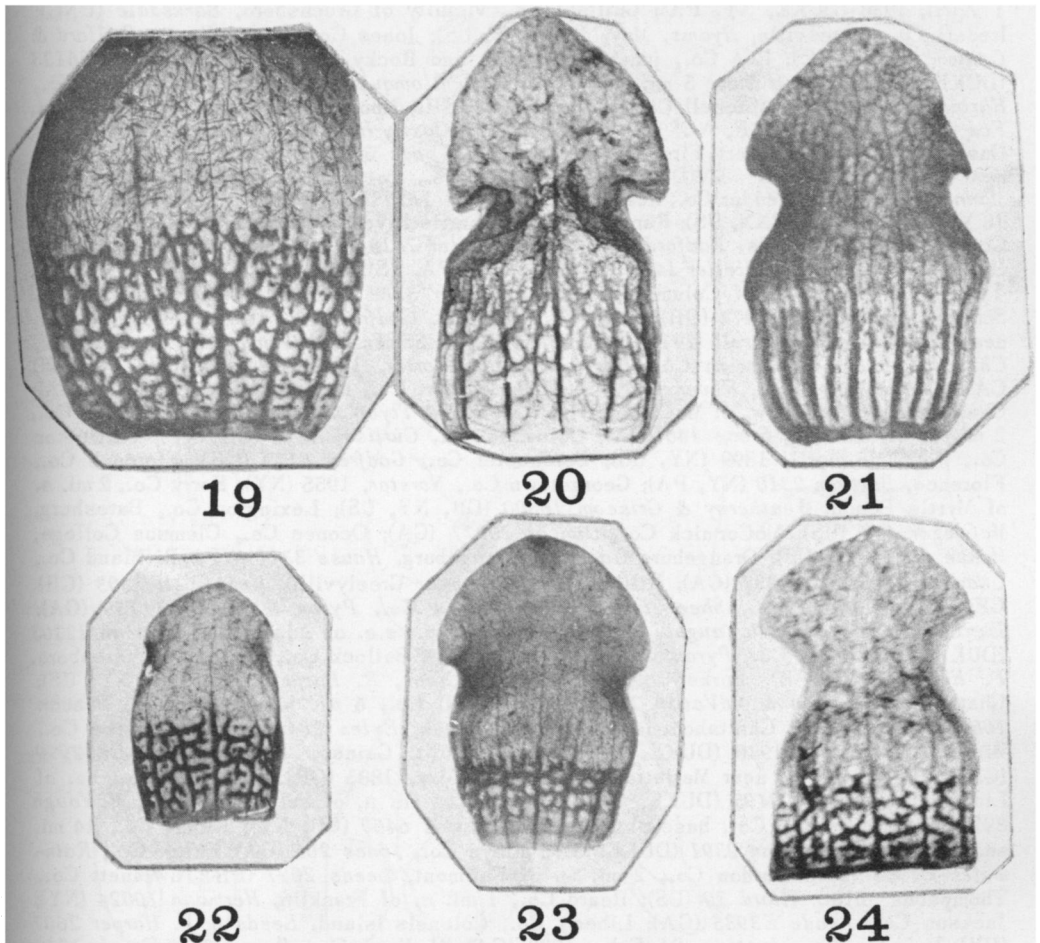
Asarum L. sect. *Ceratasarum* A. Br. Ind. Sem. Hort. Bot. Berol. Append. 13, pro parte. 1816.

Asarum L. subg. *Ceratasarum* (A. Br.) Schmidt in E. & P. Nat. Pfl. ed. 2. 16b: 231, pro parte. 1935.



FIGS. 13-18. Stamens and pistils of species of *Hexastylis*. FIG. 13. *H. shuttleworthii*. FIG. 14. *H. heterophylla*. FIG. 15. *H. lewisii*. FIG. 16. *H. virginica*. FIG. 17. *H. contracta*. FIG. 18. *H. arifolia*.

Low, evergreen, aromatic herbs with essentially glabrous, coriaceous, lustrous leaves, the blades varying from triangular- to ovate- or cordate-sagittate or -sub-hastate, or from cordate to orbicular or reniform, often mottled light green, the petioles much longer than the blades, with a bud in the axil, borne on thick, short rhizomes with scale leaves, each branch bearing one normal leaf each season, this usually persisting into the next season. Roots thick and fleshy with slender branch roots. Flowers solitary, terminal on the branches, subtended by a keel-shaped bract, the pedicels relatively short, often curved. Vestigial petals none. Calyces flask-shaped, cylindric, cylindro-urceolate, or cylindro-campanulate, often with a more or less prominent flare about the middle or above, with three



FIGS. 19-24. Ridged reticulations inside the calyx-tubes of some species of *Hexastylis*. FIG. 19. *H. shuttleworthii*. FIG. 20. *H. heterophylla*. FIG. 21. *H. lewisii*. FIG. 22. *H. virginica*. FIG. 23. *H. minus*. FIG. 24. *H. contracta*.

and less often variegated. In the southern limits of its range, the leaves tend to be more ovate-sagittate as in var. *callifolia*. In fact, in the western panhandle of Florida and in southern Louisiana, these two varieties are difficult to distinguish in herbarium specimens. In eastern Tennessee, var. *ruthii* replaces var. *arifolia* and is quite distinct from the latter in the shape of the calyx. In adjacent areas, however, as in western North Carolina and northern Georgia, these two varieties are often difficult to distinguish in pressed specimens.

Representative specimen: VIRGINIA: Norfolk Co., Britton & Small, 25 May, 1893 (NY); Princess Anne, Fernald & Griscorn 4388 (GH). NORTH CAROLINA: Beaufort Co., Bath, Weatherby 6085 (GH, US); Bladen Co., 8 mi. s.e. of Elizabethtown, Radford 6861 (UNC); Brunswick Co., 8 mi. s. of Wilmington, Godfrey & White 7042 (DUKE, GH, NCS, US); Buncombe Co., Biltmore, Bilt, Herb. 1201b (GH, NY, PA, US); Chatham Co., Edwards Mt., Radford & Stewart 65 (UNC); Columbus Co., Lake Waccamaw, Morton 2111a (US); Craven Co., 5 mi. n.w. of Newbern, Godfrey 3720 (US); Cumberland Co., 1.3 mi. n. of Cedar Creek, Silliman & Munson, 2 Aug. 1954 (UNC); Durham Co., Duke Forest, Blomquist 3069 (DUKE); Forsyth Co., Winston-Salem, Lehman, 1878 (DUKE); Granville Co., Blomquist,

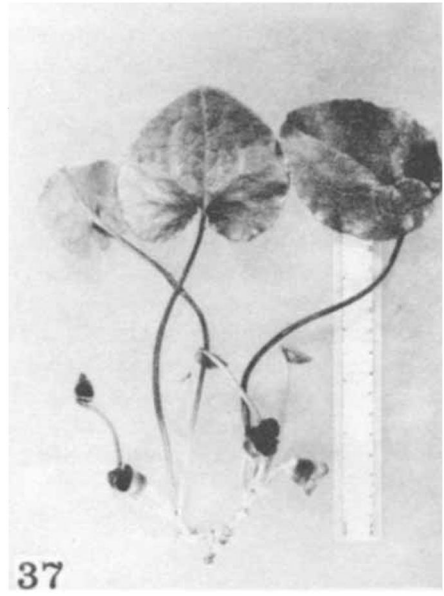
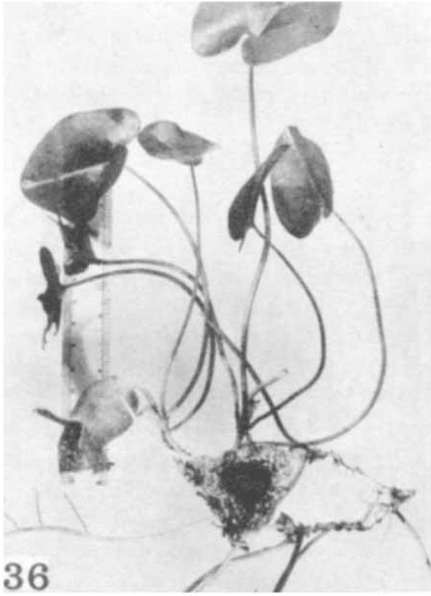


FIG. 36. *Hexastylis shuttleworthii*. FIG. 37. *H. heterophylla*.

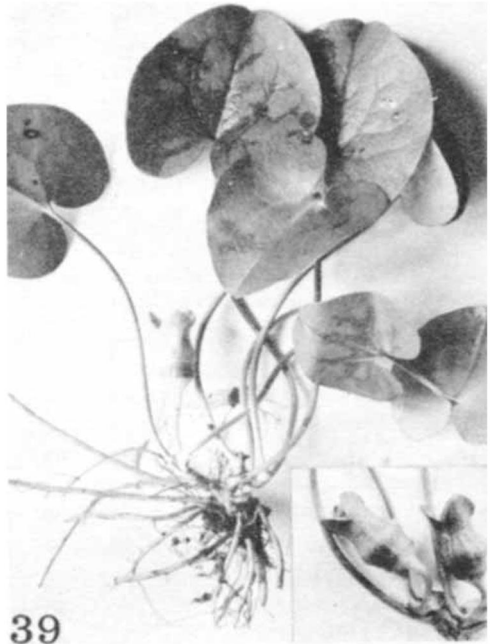
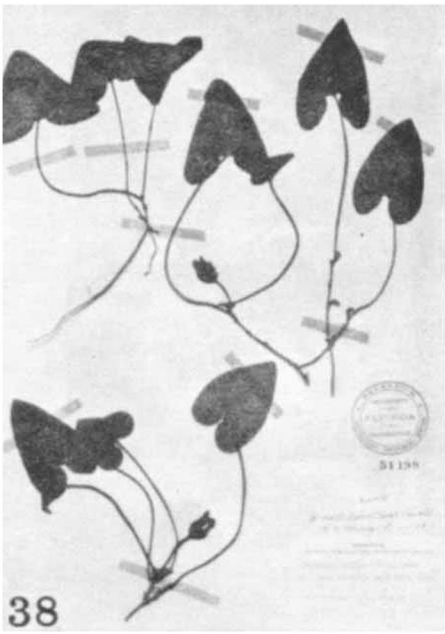
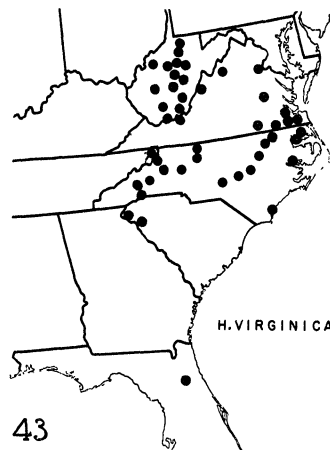
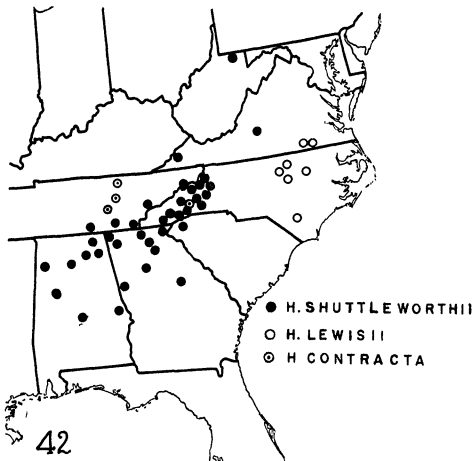
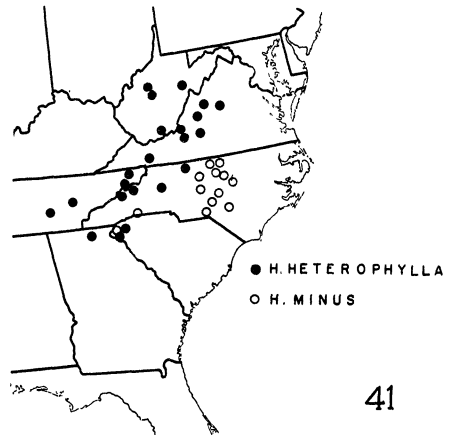
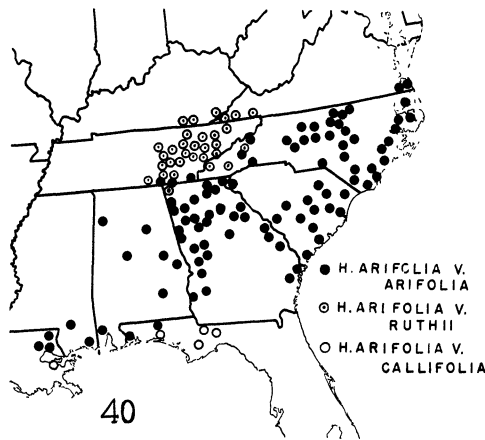


FIG. 38. *Hexastylis arifolia* var. *callifolia*. FIG. 39. *H. contracta*.



FIGS. 40-43. Distribution records of the taxa of *Hexastylis* in North America.

with long internodes, others short and flower-bearing (figs. 4, 15, 21, 28). Type locality: "Mixed woods along Rattlesnake Creek, below Wright's Bridge, Brunswick County, Southeastern Virginia." TYPE: *Fernald & Lewis 14532* (GH).

Distribution: low, swampy woods, subjected to occasional flooding, from southeastern Virginia to lower Piedmont and upper Coastal Plain of North Carolina (fig. 42).

Specimens examined: VIRGINIA: Brunswick Co., Rattlesnake Creek, below Wright's Bridge, *Fernald & Lewis 14532* [TYPE] (GH); Whiteroad Creek, near Triplett, *Fernald & Lewis 14531* (DUKE, GH, NY, TENN, US); Seward Forest, near Ante, *Fernald 14818* (GH, US); Greensville Co., *Lewis*, 17 May, 1943 (GH). NORTH CAROLINA: Bladen Co., *Cole*, 24 May, 1929 (UNC); Durham Co., no. of Bennett Memorial, *Blomquist 13656*. [TYPE of *Hexastylis pilosiflora*] (DUKE); Granville Co., near Oxford Tobacco Experiment Station, *McLean*, 26 April, 1936 (DUKE); Camp Butner, *Batson*, 18 May, 1950 (DUKE); Wake Co., 5½ mi. ne. of Holly Springs, *Radford & Beard 7983* (UNC).

6. *Hexastylis minus* (Ashe) Blomquist, comb. nov.

Asarum virginicum Ashe, Jour. Elisha Mitchell Soc. 14: 31. 1897. Non. L. Sp. Pl. 442. 1753.

Asarum minus Ashe, Jour. Elisha Mitchell Soc. 14: 33-34. 1897.

Calyx cylindro-campanulate with a prominent flare about the middle or slightly above this, thick-walled, the tube 1-1.5 (1.3) cm long, ridged-reticulate inside