STUDIES OF THE SOUTHEASTERN UNITED STATES FLORA. IV. OLEACEAE[1]

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The Oleaceae is represented in our area by eight genera, four of which were introduced as ornamentals and have since become established to varying degrees in our flora.

In providing the treatment of the Oleaceae for the Southeastern Flora Project, a number of taxonomic decisions had to be made which demand some explanation prior to publication of the manual.

The treatment of the Oleaceae for the "Generic Flora of the Southeastern United States" (Wilson and Wood, 1959) should be consulted for a thorough description and discussion of the family, genera, and relationships.

The distribution of species is based on the specimens seen at A, DUKE, FLAS, GH, NCU, NSC, SMU, and US. It is imperative for anyone working on plants of the southeast to see—as a bare minimum—the specimens of A, GH, NCU, SMU, and US.

Key to Genera

1. Leaves pinnately compound, or reduced to one leaflet with an articulated petiolule; fruit a samara or 2-lobed berry.
   2. Trees or large shrubs; flowers apetalous; fruit a samara; leaves usually pinnate (Tribe Fraxineae) . . . . . I. FRAXINUS.
   2. Shrubs; flowers with showy corollas; fruit a 2-lobed berry; leaves pinnate or reduced to one leaflet (Tribe Jasmineae) . . II. JASMINUM.
1. Leaves simple or occasionally ternate in No. III; fruit a capsule, drupe, or drupe-like unlobed berry.
   3. Flowers yellow, appearing before the leaves (Tribe Forsythieae) . . . . . III. FORSYTHIA.
   3. Flowers white, lavendar to purplish, or apetalous, appearing before or with the leaves.
      4. Fruit a loculicidal capsule; flowers lavender to purplish or rarely white (Tribe Syringeae) . . . . . IV. SYRINGA.

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[1] Taken from a manuscript and notes compiled for the *Vascular Flora of the Southeastern United States*. The area covered in this treatment is bounded by and includes Delaware, Maryland, West Virginia, Kentucky, Arkansas, and Louisiana. The format follows Radford et al. (1967) except for punctuation. Any needed modifications or suggestions should be sent to me as soon as possible so that corrections can be made before the manual is in press. The first three parts of this numbered series with the same title are in the Journal Elisha Mitchell Sci. Soc. 87 (1), 87 (2), and 88 (1).

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4. Fruit a drupe or berry; flowers white or apetalous (Tribe Oleeae).
   5. Corolla absent; flowers in scaly, short, lateral racemes or cymes; calyx minute or lacking . . . . . V. FORESTIERA.
   5. Corolla present; flowers in panicles; calyx present.
      6. Petals linear, united at base only; young inflorescence spreading or drooping . . . . . VI. CHIONANTHUS.
      6. Petal lobes broad and short above a distinct funnelform tube; young inflorescence erect or merely spreading.
         7. Inflorescence a few-flowered axillary panicle; leaves evergreen; drupe unilocular . . . . . VII. OSMANTHUS.
         7. Inflorescence a many-flowered terminal panicle; leaves deciduous or evergreen; drupe-like berry 2-locular . . . . . VIII. LIGUSTRUM.

I. FRAXINUS L. Ash.

This genus of some 65 species is represented in the southeastern U. S. by six species. Their relationships are discussed by Wilson and Wood (1959) and indicated in the key.

The taxonomic treatment is a conservative one. The problematic complexes are in Subsection Melioides where there is both ecotypic and ecophenic variation, as well as hybridization. All the complexes are in need of further biosystematic studies.

1. Calyx deciduous or lacking; terminal bud scales foliose (Subsect. Fraxinus).
   2. Branchlets 4-angled; lateral leaflets petiolulate; flowers with small deciduous calyx . . . . . 1. *F. quadrangulata.*
   2. Branchlets terete; lateral leaflets sessile; flowers without calyx . . . . . 2. *F. nigra.*
1. Calyx present and persistent in fruit; terminal bud scales not foliose (Subsect. Melioides Endl.).
   3. Leaves papillose beneath; wing of samara terminal or only slightly decurrent along upper third of body . . . . . 3. *F. americana.*
   3. Leaves not papillose beneath; wing of samara decurrent to near middle of body or beyond.
      4. Body of samara flattened and winged to the base . 4. *F. caroliniana.*
      4. Body of samara terete or nearly so and winged to near the middle or slightly beyond.
         5. Petiolule of lower leaflets winged nearly to base; samara wing usually less than 7 mm. wide, and body less than 2 mm. wide . . . . . 5. *F. pennsylvanica.*
         5. Petiolule of lower leaflets wingless; samara wing more than 7 mm. wide, and body more than 2 mm. wide . . . . 6. *F. profunda.*

1. *F. quadrangulata* Michx., Blue Ash.

Dry or moist rich woods; var. prov., chiefly IP, Ala., Ark., Ga., Ky., Tenn.,

W.Va. (Okla., Mo., Ill., Ind., Ohio).

The distribution of Blue ash is spotty and in a number of physiographic provinces. See Little (1971, map 128-E) for details.

2. *F. nigra* Marsh., Black Ash.

Wet woods, stream banks, bogs or swamps; pied. Del., Va., mts. Md., W.Va. (Ill., Ind., Ohio, Penn., N.J.).

Gleason and Cronquist (1963) record this species for Ky. No specimens have been seen to verify this record and neither Little (1971) nor Meijer (1971) include it for the state.

A chromosome count is needed for this species.

3. *F. americana* L., White Ash.

Rich upland woods, dry slopes, well-drained flat woods; all prov. SE (ALL).

Incl. *F. biltmoreana* Beadle, *F. catawbiensis* Ashe—S; incl. *F. a.* var. *biltmoreana* (Beadle) J. Wright ex Fern—F, R; incl. *F. a.* var. *microcarpa* Gray—F.

Although all provinces are represented, White ash is absent from most of the lower woods of the Atlantic and Gulf Coastal Plain and Mississippi embayment. See Little (1971, map 126-E) for details.

This is one of the extremely polymorphic species, or species complexes, involving ecotypic (Wright, 1944a) and ecophenic variation, three ploidy levels ($2n=46$, 92, 148), plus hybridization (Miller, 1955). The Biltmore ash has frequently been distinguished as a species or variety by various authors. Although the extremes, involving a number of characteristics seem clear enough, there is neither a real morphological discontinuity between them, nor a clear ecological or geographical separation. In some areas, such as Mississippi, Biltmore ash occurs in acid soil while White ash is a calciphile, but this does not seem to hold up elsewhere. One interpretation (Miller, 1955) is that the Biltmore ash represents a hybrid between *F. americana* and *F. pennsylvanica*. This needs a thorough investigation, although substantiated by the work of Santamour (1962). Variety *microcarpa* Gray seems to be a small-fruited form that appears randomly through the population. The type named by Ashe as *F. catawbiensis* from the piedmont of Georgia and the Carolinas seems to be a pubescent form with some characteristics reminding one of either *F. caroliniana* on one hand or *F. profunda* on another. This needs critical study.

Until the pattern and origin of the variation and presence of any real discontinuities are known more exactly than now, I prefer to think of White ash as one polymorphic species without segregate species or varieties. See also Little (1952) for a discussion of varieties.

4. *F. caroliniana* Mill., Water Ash, Pop A., Carolina A.

Low woods, river bottoms, cypress heads, swamps, hammocks; chiefly cp., Ala., Ark., Fla., Ga., La., Miss., N.C., S.C., Va. (Tex.)

Incl. *F. pauciflora* Nutt.—S; incl. *F. c.* var. *oblanceolata* (Curtis) Fern. & Schub., *F. c.* var. *cubensis* (Griseb.) Lingelsh.—F.

As indicated by the synonymy above and the additional names given by

Little (1952, 1953), this is an extremely variable species. In fact, Fernald (1950) considered it "our most variable species [of ash]" and recognized three varieties each with two forms. The variation involves the shape and size of samaras, and pubescence of petiole, rachis, and leaflet. As with White ash, the variation seems fairly random without any real morphological-ecological-geographical types that should be considered distinct at any level.

5. *F. pennsylvanica* Marsh., Green Ash, Red A.

Moist or wet alluvial soils, river and stream margins, swamps; all prov. SE except penin. Fla. (ALL).

Incl. *F. darlingtonii* Britt., *F. smallii* Britt.—S; incl. *F. p.* var. *subintegerrima* (Vahl.) Fern.—F, R.

A detailed distribution map is given by Little (1971, map 130-E).

The variability in this species is seen in the pubescence, shape and texture of the leaflets, and shape and size of the samaras. Three ecotypes have been distinguished by Wright (1944b). Again there appears to be no real discontinuity between any of the forms. The glabrous variety *subintegerrima* is recognized by a number of authors but it grows with var. *pennsylvanica* and there is apparently no barrier to interbreeding. I view the variation in pubescence in this species as similar to that in White ash, thus for the sake of consistency, I am not recognizing varieties.

The common names are somewhat confused. When the more common and widespread glabrous var. *subintegerrima* was recognized, it was called Green ash, and the pubescent var. *pennsylvanica* was called Red ash. When the two varieties are not distinguished, Green ash is the preferred common name and the one used by the U. S. Forest Service (Little, 1953).

6. *F. profunda* (Bush) Bush, Pumpkin Ash.

Swamps and river bottoms; chiefly cp., SE except Del., Ky., W.Va., (Mo., Ill., Ind., Ohio).

Incl. *F. michauxii* Britt.—S; *F. tomentosa* Michx. f.—R, G, F.

The Pumpkin ash is possibly either an autopolyploid of *F. pennsylvanica* or an allopolyploid (hexaploid $n=69$) derivative of *F. americana* ($n=46$) $\times$ *pennsylvanica* ($n=23$). Wright (1944b, 1957, 1965) and Miller (1955) discuss this further. This needs a thorough investigation.

The name of this species has been shifted back and forth between *F. profunda* and *F. tomentosa* for a number of years. According to Little (1952), *F. tomentosa* must be rejected as nomenclaturally superfluous when published. This represents another nomenclatural change not too unlike *Betula lutea* to *B. alleghaniensis* (Hardin, 1971).

II. JASMINUM L. Jasmine.

It is extremely frustrating to deal with the taxonomy and nomenclature of those groups that are only naturalized in the Southeast. There is no easy way to gain a real concept of the species and be certain of the correct nomenclature. It is also very difficult to tell from herbarium specimens which species are really naturalized and not just escaped or persistent from cultiva-

tion. Collectors should note this distinction on the label.

In this treatment of the Oleaceae, the Jasmines, Forsythias, and Ligustrums have to receive a tentative treatment heavily dependent upon the available literature.

Some of the nomenclature in Wilson and Wood (1959) and other authors apparently is incorrect according to Read (1962). Long and Lakela (1971) follow Read in naming the Florida plants, and I will do likewise here for those naturalized in the Southeast.

1. Corolla yellow . . . . . 1. *J. mesnyi.*
1. Corolla white or pink tinged.
  2. Leaves of 3–7 leaflets.
    3. Leaflets 3; calyx very short compared with corolla tube . . . . . 2. *J. fluminense.*
    3. Leaflets 5–7; calyx half or as long as corolla tube . . 3. *J. officinale.*
  2. Leaves 1-foliolate (apparently simple).
    4. Calyx glabrous or nearly so, the lobes less than 3 mm. long . . . . . 4. *J. dichotomum.*
    4. Calyx pubescent, the lobes 4–12 mm. long.
      5. Calyx lobes densely pubescent . . . . . 5. *J. multiflorum.*
      5. Calyx lobes hirsute on the edges or pilose.
        6. Calyx lobes mostly 7–12; stems puberulent; leaves with tufts of pale hairs in axils of veins beneath . . . . . 6. *J. sambac.*
        6. Calyx lobes 5–7; stems glabrous; leaves glabrous beneath . . . . . 7. *J. nitidum.*

1. *J. mesnyi* Hance, Primrose Jasmine.

Edges of woods, creek banks; cp. Fla., Ga. (Tex.).

This species is a native of western China. It is not commonly grown and hence rarely found escaped or naturalized.

2. *J. fluminense* Vellozo, Azores Jasmine, Climbing J.

Weedy in waste places and old fields; cp. s. Fla.

Incorrectly called *J. azoricum* L. (Read, 1962), it is a native of Brazil.

3. *J. officinale* L., Poet's Jasmine, Common J.

Pinelands and thickets, waste places; cp. s. Fla.

Incl. *J. grandiflorum* L.—S.

This is a native of India and China and is the hardiest of the white-flowered Jasmines. The large flowered form represented by nearly all our materials, is known in the trade as var. *grandiflorum* (L.) Bailey (forma *grandiflorum* (L.) Kobuski). I prefer not to recognize these cultivars formally.

4. *J. dichotomum* Vahl, Gold Coast Jasmine.

Vacant lots, roadsides, hammocks; cp. s. Fla.

As implied by the common name, this is a native of Ghana and the west coast of Africa.

5. *J. multiflorum* (Burm. F.) Andr., Furry Jasmine, Downy J. Waste places,

cp. s. Fla.

This species has been found naturalized in Highlands Co. Fla. It is a native of India and southeastern Asia.

6. *J. sambac* (L.) Solander in Ait., Arabian Jasmine.

Hammocks, woods, and thickets; cp. s. Fla.

Naturalized from tropical Asia.

7. *J. nitidum* Skan

Hammocks, disturbed sites; cp. s. Fla.

Erroneously known as *J. amplexicaule* Wall. ex Don; or *J. undulatum* Ker.—S.

Naturalized from the Admiralty Islands.

III. FORSYTHIA Vahl, Forsythia, Golden Bells.

Forsythia has not been considered heretofore as part of the Southeastern Flora. It was not included by either Small (1933) or Wilson and Wood (1959). Although it is a very commonly cultivated ornamental shrub, and may persist about old dwellings, it seldom becomes established or naturalized. One of the possible reasons for the lack of establishment and few seeds is its heterostylous nature. If the shrubs are self-incompatible, and both of the distylic forms are not close enough for cross-pollination, there would be no seeds produced. This hypothesis needs verification.

As indicated under *Jasminum*, it is difficult to determine naturalization by information on herbarium sheets. There are a number of records, however, of local establishment of the two species included here. It appears that we have to include the Forsythias as part of the Flora.

1. Mature branches with hollow or irregularly excavated pith between the nodes; leaves oblong-ovate; branches generally arching or drooping . . . . . 1. *F. suspensa.*

1. Mature branches with chambered pith; leaves oblong-lanceolate; branches usually erect . . . . . 2. *F. viridissima.*

1. *F. suspensa* (Thunb.) Vahl.

Edge of woods, waste places; Va.

2. *F. viridissima* Lindl.

Edge of woods, creek banks, road sides and waste places; Ark., Md., N.C., Va. (Ill.).

IV. SYRINGA VULGARIS L., Common Lilac.

Waste places, fence rows, edge of woods; Md., Va. (Mo., N.J.).

This native of southeastern Europe persists from old plantings, and sparingly escapes in the cooler parts of our area. The Persian Lilac (*S. persica* L.) is frequently cultivated and escapes rarely but has not become established in our area as far as I know.

V. FORESTIERA Poir., Forestiera.

There is need for studies of ecophenic, ecotypic, and clinal variation and introgression as indicated by Wilson and Wood (1959). I am following Johnston (1957) here for the most part.

Shinners (1959) has determined *F. porulosa* as the correct type of the genus.

1. Leaves evergreen, margins entire . . . . . 1. *F. segregata.*
1. Leaves deciduous, margins serrate or minutely so.
   2. Plants flowering before the leaves expand; fruits slender, length 2 or more times the width . . . . . 2. *F. acuminata.*
   2. Plants flowering after the leaves have expanded; fruits broad, length less than twice the width . . . . . 3. *F. ligustrina.*

1. *F. segregata* (Jacq.) Krug & Urban, Florida Privet.

Two varieties, that may merely represent the extremes of an ecocline, have been recognized by Johnston (1957) and Long and Lakela (1971). See the discussion of the Florida Scrub at the end of this paper.

a. var. *segregata*

Coastal dunes, hammocks, mangrove swamps, river bottoms, low pinelands; cp., Ga., Fla.

Incl. *F. globularis* Small, *F. porulosa* (Michx.) Poir.—S.

b. var. *pinetorum* (Small) M. C. Johnston

High, dry pinelands; s. Fla.

F. pinetorum Small—S.

2. *F. acuminata* (Michx.) Poir., Swamp Privet.

Wet woods, swamps, river banks, hammocks; chiefly cp. Ala., Ark., Fla., Ga., Ky., La., Miss., S.C., Tenn. (Tex., Okla., Mo., Ill., Ind.).

3. *F. ligustrina* (Michx.) Poir.

Rocky soils, sandy stream banks, dunes, calcareous glades and uplands, granite flat rocks, swampy woods, and hammocks; chiefly cp. and adjacent provinces, Ala., Fla., Ga., Ky., La., Tenn. (Tex.).

F. pubescens Nutt.—sensu S, not Nutt.

VI. CHIONANTHUS L., Fringe-tree, Old-man's-beard.

Fringe-tree is variable in overall size, pubescence, leaf form, length of petals, stamen number, anther size, shape of anther tips, and fruit size. Some of the variants have been named as distinct species. For instance, Small (1924) recognized *C. pygmaeus*, a small shrub with small leathery leaves, blunt-tipped anthers, short petals, and large fruits, and an endemic of the sand-scrub in the lake region of south-central Florida. Li (1966) described *C. henryae*, a small shrub with small rather coriaceous leaves, prolonged anther tips, and fairly short petals, and which he said occurred in northwestern Florida, southern Arkansas, southern Alabama, and west-central Georgia. In addition, four varieties have been named on the basis

of leaf shape and pubescence.

It appears that forms with small anthers and small petals are scattered throughout the area although more frequent in dry habitats southward; the anther tips vary from rounded or very blunt to very prolonged acuminate with the blunt form mostly in south Florida. This variation needs to be thoroughly studied using fresh material and correlated with habitats and the sexuality of the flowers. At the present time, I prefer to recognize only two species. See the discussion of the Florida Scrub at the end of this paper.

1. Corolla lobes 1.5–3 cm. long; anther tips prolonged; drupe 1–1.5 cm. long . . . . . 1. *C. virginicus.*
1. Corolla lobes about 1 cm. long; anther tips blunt or acute; drupe 2–2.5 cm. long . . . . . 2. *C. pygmaeus.*

1. *C. virginicus* L.

Dry sandy woods, rocky slopes, savannahs, pocosins, swamps, rich woods; all prov. SE (Tex., Okla., Mo., Ohio, Pa., N.J.).

Incl. *C. henryae* Li; tentatively placed here on the basis of the long anther tips.

2. *C. pygmaeus* Small.

Pine scrub; s. penin. Fla.

VII. OSMANTHUS Lour., Devilwood, Wild Olive.

Devilwood is variable in leaf size, texture, and shape; fruit size, shape, and color; and inflorescence size, pubescence, and compactness. Most of the variation in and between populations is found in peninsular Florida. There is need of further study from the standpoint of the degree of isolation between the variants. See the discussion of the Florida Scrub at the end of this paper.

1. *O. americanus* (L.) Gray.

Two varieties are recognized following Green (1958).

a. var. *americanus.*

Hammocks, bays, low woods, swamps, maritime forests, rich woods; chiefly cp. Ala., Fla., Ga., La., Miss., N.C., S.C., Va. (Tex.).

Amarolea americana (L.) Small—S; incl. *O. floridana* Chapm.—S.

b. var. *megacarpus* (Small) P.S. Green.

Pine scrub; penin. Fla.

Amarolea megacarpa Small—S.

VIII. LIGUSTRUM L. Ligustrum, Privet.

The species of our area are all escapes from cultivation. They all could be more common and widespread than herbarium specimens indicate. Again, as with *Jasminum* and *Forsythia*, it is difficult to determine which are really naturalized in our area. Also, in this rather difficult genus, the taxonomy and nomenclature of our plants seem uncertain in a few cases. A revision of

the genus is needed.

1. Twigs pubescent.
   2. Corolla tube equalling or shorter than the lobes.
      3. Flowers sessile or subsessile . . . . . 1. *L. quihoui.*
      3. Flowers pedicellate.
         4. Twigs densely pubescent; leaves pubescent on midrib beneath . . . . . 2. *L. sinense.*
         4. Twigs minutely puberulent; leaves glabrous . . . 3. *L. vulgare.*
   2. Corolla tube slightly or to 3 times longer than lobes.
      5. Calyx and pedicels pubescent . . . . . 4. *L. obtusifolium.*
      5. Calyx and pedicels glabrous or slightly pubescent at base of calyx.
         6. Leaves 2–6 cm. long; twigs conspicuously pubescent . . . . . 5. *L. amurense.*
         6. Leaves 4–10 cm. long; twig minutely puberulent . 6. *L. japonicum.*
1. Twigs glabrous.
   7. Corolla tube equalling or shorter than lobes.
      8. Leaves persistent or tardily deciduous, 6–15 cm. long . 7. *L. lucidum.*
      8. Leaves deciduous, 3–6 cm. long . . . . . 3. *L. vulgare.*
   7. Corolla tube slightly or to 3 times longer than lobes.
      9. Leaves persistent and glossy, rounded or broadly cuneate at base; corolla tube slightly longer than lobes . . . . . 6. *L. japonicum.*
      2. Leaves deciduous or half evergreen, cuneate at base; corolla tube 3 times longer than lobes . . . . . 8. *L. ovalifolium.*

1. *L. quihoui* Carr., Wax-leafed Ligustrum.

Rare in low woods, waste places; cp. N.C., Va. (Tex.).

2. *L. sinense* Lour., Chinese Privet.

Low woods, fence rows, waste places; various prov. SE except Del. and W.Va. (Tex., Okla.). This is probably the most frequently and widely escaped and naturalized of the privets.

3. *L. vulgare* L., Common Privet.

Thickets, open woods, low woods; various prov. Ala., Ark., Ky., La., N.C., S.C., Tenn., W.Va. (Tex., Ill., Ind., Ohio, Penn., N.J.).

4. *L. obtusifolium* Sieb. & Zucc.

Thickets, edge of woods, roadsides; rarely established in Ky., Md., N.C. (Penn.).

5. *L. amurense* Carr., Amur Privet.

Thickets, open woods; rare, cp. and pied. N.C. and Va. (Tex.).

6. *L. japonicum* Thumb., Japanese Privet.

Low woods, infrequently established; cp. pied. Ala., N.C., S.C. (Tex.).

7. *L. lucidum* Ait., Wax-leafed Privet.

Low woods and thickets; cp. Ala., Ga., La., Miss. (Tex., Penn.).

8. *L. ovalifolium* Hassk., California Privet.

Hammocks, roadsides, thickets; infrequent in cp. and pied., Fla., Ky., Md., N.C. (Tex., Mo., Penn.).

SPECIES OF THE FLORIDA SCRUB

The distinctness of the "scrub" or "Florida scrub" has long been known and described (Nash, 1895; Harper, 1915, 1927; Mulvania, 1931; Kurz, 1942). These are areas of deep white to gray, fine sands on fairly recent or very ancient dunes, bars, or ridges. The vegetation is dominated by *Pinus clausa* and scrub oaks and a mosaic of shrub thickets and open white sand. It is an extreme habitat of low fertility, excessively drained deep sand, and high summer temperatures.

Davis (1967) shows the distribution of these scrub forests along the northwestern and eastern coasts, scattered small inland "islands" in the peninsula, and large areas in Marion, Lake, Volusia, Polk, and Highland counties.

The origin and distinctness of these habitats is important when considering the Oleaceae of the Southeast for *Chionanthus pygmaeus* and *Osmanthus americanus* var. *megacarpus* occur in the scrub.

Chionanthus pygmaeus is found in the scrub of Highlands, Hillsborough, and Polk counties. It seems to be fairly distinct as a small shrub with smaller leaves, smaller petals, blunt-tipped anthers, and larger drupes. *Chionanthus virginicus* occurs in more mesic or wet habitats and the two seem both geographically and ecologically isolated. It is for this reason that I am recognizing two species. The problem here is that individual characters appear to vary throughout the range of *Chionanthus* as indicated earlier. However, only in the south Florida scrub is there the correlation of the features characterizing *C. pygmaeus*. The more recently described *C. henryae* is somewhat similar to *C. pygmaeus* in morphology and habitat and, although disjunct from *C. pygmaeus*, *may* be related or reflect similar ecotypic differentiation. This needs further study.

Osmanthus americanus var. *megacarpus* is found in the scrub of Hernando, Highlands, Polk, Osceola, Sarasota, and Sumter counties. It is characterized by a smaller habit, often smaller leaves, and larger fruits. The typical var. *americanus* is widespread and in hammocks, bays, low woods, and swamps. Although ecologically allopatric, the two are geographically sympatric and probably not completely reproductively isolated. Intermediates do occur, and I prefer to use the varietal level for these extremes.

Forestiera segregata var. *pinetorum* does not occur in the typical scrub but is in the drier pinelands of Dade County. The extreme form is distinct with smaller leaves, puberulent stems, and smaller drupes. The typical var. *segregata* has larger leaves, glabrous stems, and larger fruits and occurs in more mesic habitats and is more widespread geographically. The two are geographically sympatric and probably not entirely isolated reproductively. Intermediates do occur and I think the varietal level is appropriate here.

It may seem inconsistent in this treatment of the Oleaceae to recognize these variants in the scrub or high pinelands on the one hand, and on the other not to formally recognize the tremendous variation in some of the ashes. My justification lies in the relative distinctiveness of the Florida scrub

vegetation. Until detailed biosystematic studies are made, I consider the differences in these plants to be more than mere ecotypes, for they seem relatively isolated from their counterparts in more mesic environments. In addition, they may have been isolated for a very long time since these habitats are considered ancient dunes or coastal bars or ridges.

The adaptations seem rather obvious. The smaller habit, smaller leaves, smaller petals, and pubescence are all probably adaptations to the severe dry conditions of potentially high transpiration rates and insufficient soil water. The larger drupes of *Chionanthus* and *Osmanthus* may reflect a selective pressure at the time of seedling establishment. The larger seeds with more stored food may have a better opportunity for more vigorous growth and are thereby able to establish a more extensive root system and escape dessication following germination. Another possible explanation, and a rather intriguing one, is that the larger drupes reflect differential selection by the Florida gopher, or Gopher tortoise (*Gopherus polyphemus*). This tortoise is common in these dry sandy habitats and are known to eat fleshy fruits. One could imagine their selection for larger drupes, and then possibly a higher germination rate among the seeds that pass through their bodies and germinate in a nitrogen-rich environment. Regardless of the particular selection mechanisms, these appear to be good examples of adaptive radiation and parallel evolution in related genera.

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