OBSERVATIONS ON THE FLORA OF THE SOUTHEASTERN UNITED STATES WITH SPECIAL REFERENCE TO NORTHERN LOUISIANA

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The appearance in the lower portions of the Gulf Coastal Plain of northern woodland elements has long aroused the curiosity and subsequent comment of botanists. A consensus of opinion has it that these plants are leftovers of Pleistocene floras; certainly their almost invariably "insulated" location in steep, highly shaded ravines or in deep, relatively undisturbed mesic woodlands, is strongly suggestive of such a history. Particularly noteworthy areas are to be found in northwestern Florida (Marianna Caverns State Park, the Apalachicola River bluff country) and in southern Alabama. Certainly these regions of the Gulf Coastal Plain are far richer in such species than are the more monotonous physiographies of Mississippi and Louisiana. The same may also be said of endemic species, the number being far higher in Florida and Alabama than is true for Mississippi or Louisiana; again the explanation is probably tied in with the greater topographic and geologic diversity in the former two areas.

In the spring of 1959 and again in the period from 1962 to 1964 I became interested in locating habitats which would yield similar species in northern Louisiana. The northern parishes of Louisiana have long been known to harbor certain species more typical of the Interior Highlands, Appalachians, or woodlands and prairies of the central lowlands. Several species had already been reported on or collected by Dr. John Moore, Dr. Clair Brown, Miss Caroline Dormon or Dr. L. H. Shinners (i.e. some noteworthy finds such as *Uvularia sessilifolia, Erythronium rostratum, Lilium michauxii, Cypripedium calceolus, Quercus macrocarpa, Silene virginica, Sanguinaria canadensis, Geranium maculatum, Dodecatheon meadia, Viola eriocarpa, Silphium terebinthinaceum, S. laciniatum, Cacalia plantaginea*, and many more). Thus the results of my own field work have not been very exciting in terms of new finds. Often a full day of investigating what seemed to be fine collecting areas of hardwood forested tracts, richly endowed with deep rich soils, would net me nothing in the way of species which would have abounded in similar habitats to the north in the mid-west. Yet, when I would, with much walking and a little luck, finally come on a northern woodland element it would be in considerable, often breathtaking, abundance. However, such finds would usually be only of one or two species. For example, a wooded area of alluvial high bank might yield clouds of yellow *Ery-*

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thronium, but hardly another species while a similar habitat in Missouri or Illinois would have *Trillium recurvatum, Anemonella, Phlox, Sanguinaria, Mertensia, Viola (missouriensis, eriocarpa,* and others), etc. Searches of wooded ravine floras were often more disappointing. In the course of some of these long, often fruitless, walks, I finally began to see what a possible explanation could be. Most of the discoveries appeared to be of clones rather than dispersed populations of many clones; this is an indication that some barrier to development of seedlings is active or at least intermittently active.

Reasoning further, and on the basis of observations in northern Louisiana and east Texas, there appear to be two sorts of habitat complexes of northern woodland plants. One group is comprised of ravine bank species, i.e. *Adiantum pedatum, Woodsia obtusa, Carex jamesii, Chamaelirium luteum, Lilium michauxii, Campanula americana, Cypripedium calceolus, Quercus borealis, Magnolia acuminata, Silene virginica, Saxifraga virginiensis, Hydrangea arborescens, Amelanchier arborea, Cynoglossum virginianum, Erigeron pulchellus, Senecio obovatus.* Another appears to be found on alluvial sites: *Uvularia sessilifolia, Polygonatum biflorum, Erythronium rostratum, Trillium recurvatum, Sanguinaria canadensis, Dentaria laciniata, Podophyllum peltatum, Gillenia stipulacea, Senecio aureus, Polymnia uvedalia,* etc. A third and smaller group does not appear to be as selective and may be fairly abundant in either sort of habitat, i.e. *Botrychium virginianum, Podophyllum peltatum, Phlox divaricata, Arisaema triphyllum, Lindera benzoin.*

The first group appears to be hanging on where cold air drainage is most likely to be impounded, where there is more cool air because of less intense insolation, where rough topography more likely maintains their narrow foothold on life simply by making an area less suitable for crop farming, pasture, or logging.

The second group persists like shallow pools left by a retreating Pleistocene tide, namely on "older" alluvial soils. These areas must be little disturbed; grazing or logging, however light, appear to have a final effect. In the midwestern United States, where all of this alluvial complex of species is far more abundant, succession on newly formed alluvium is quite rapid. Thus, as rapidly as a meandering stream cuts through older alluvium, newly created area is being occupied by seedlings and the species remain abundant. In northern Louisiana this does not seem to be the case. One is struck by the size, also the infrequency of the population there.

A possible explanation, in the case of the first group, is that the ravine species are being eroded out of suitable habitats by headward cutting of streams. This first of all relates to the immensely greater amount of erosion water during the wet cycles of the Pleistocene, a period during which much sharp cutting was occurring with the creation of many good

ravine habitats for such plants to occupy. Probably these situations at close of the Pleistocene were similar to the spring woodlands of northern Illinois and were filled with an abundance of species, all of course reproducing prolificaliy by seed. After the Pleistocene, and accompanying a warming and drying, the number of suitable habitats to the south decreased and therefore the area of such species decreased, becoming confined to the coolest localities (i.e. deeper ravines, north-facing steep wooded slopes). As the erosion cycle progressed, ravines widened and warmed save at their heads; hence the surviving populations migrated headward in the ravines and branch ravines. Most of such migration was, and is, through lateral movement of vegetative propagules. This would account for the presence of isolated populations in the branches of major drainages such as the Bayou D'Arbonne in northern Louisiana, and their usual absence along the larger, broader valley slopes. Thus, as erosion continues, and as warmer conditions poor for reproduction by seed persist, the fate of the few remaining stands of plants is predictably poor. This may also explain the sparse number of species in any one locality.

In the case of the second, or alluvial woodland, group there again appears to be a maintenance primarily by vegetative reproduction. Populations of *Podophyllum*, for example, are large, luxuriant, and probably very ancient. The same is true for *Erythronium, Trillium, Sanguinaria, Dentaria, Polygonatum, Uvularia*. They invariably occupy older alluvial terraces of streams. In northern Louisiana west of the present delta the bulk of the streams reside in quite old valleys, which often have two definable terraces. The older terraces probably represent the boundary of oscillation of streams whose load was vastly greater; confined within these boundaries are the more recent floodplains of the present streams. In the newer floodplains, portions of the older floodplains exist as low, gradually eroding, islands; if such are wooded and relatively undisturbed they are often abundantly carpeted by one or more of the above-mentioned types of plants. Little or no reproduction by seed seems to go on, but vegetative reproduction does. Gradually, these populations are worked away by the cutting of the streams, become more and more isolated from one another and ultimately disappear. Again, as is the case with the ravine plants, their fate is plain unless the weather pattern in the region should again change. It is interesting to see these old "islands" of *Podophyllum, Erythronium, Trillium* etc. being melted away by the inexorable cutting action of the streams. Many such examples are presently in evidence along the Bayou D'Arbonne, the Bayou Bartholemew, Sugar Bayou and on a grander scale along the Red River and its tributaries to the west.

In northern Louisiana west of the big delta of the Mississippi which is bounded to the west by the Ouachita River, a sort of axis of parishes exists south of which many of the above-mentioned plants do not seem

to occur. This axis, from my observations, appears to be through Ouachita, Lincoln, Bienville, Webster, and Caddo Parishes and it is only broken by the Red River system. *(Erythronium, Uvularia, Polygonatum* have been found south of this axis but only along the Red River). While mesic woodland elements are plentiful south of the axis, they are of a different history. In fact these (i.e. *Trillium maculatum, Magnolia grandiflora, Viburnum acerifolium, Ilex longipes, Asimina parviflora, Acer barbatum, Acer leucoderme, Magnolia pyramidata, Lilium michauxii, Ilex vomitoria, Hydrangea quercifolia)* appear to be part of an older forest whose movement into Louisiana was from the east in the Gulf Coastal Plain. In fact, and as commented on by earlier workers, there is a striking similarity between the floras of Sabine Parish, Louisiana and the Big Thicket of eastern Texas, and that of northwestern Florida and southern Alabama. Some species have been winnowed out from east to west, but a great many are shared by all areas.

It would seem to me that one of the most critical areas for descriptive or floristic ecology remains literally untouched in northern Louisiana and eastern Texas. Many extensive stands of hardwood forest still remain relatively undisturbed as the region is still not very heavily populated. However, such studies must be done soon. Industry in the form of hardwood pulp, veneer, and furniture mills is rapidly moving into the region; in many other parts of these areas hardwoods are being cleaned out to make room for pine. Many of the beautiful streams of northern Louisiana are being dammed up with a subsequent destruction of bottomland hardwood communities.

ANNOTATED LIST OF NOTEWORTHY SPECIES

Most of the collection of plants here cited have been gotten from the Gulf Coastal Plain by the present author during a period extending from 1958 to the present; a few represent earlier field activity in Florida or records now in the Herbarium of Vanderbilt University from other sources. While several do not constitute state records, they are reported as significant toward a better understanding of floras of the states involved. Certainly these reports should indicate the value of further field exploration of the region.

Species are cited in accordance with Engler and Prantl.

Voucher specimens of all collections are deposited in the Herbarium of Vanderbilt University (VDB), Nashville, Tennessee.

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Woodsia obtusa (Spreng.) Torr.

LOUISIANA. UNION PAR.: 3 mi. s. Farmerville on arenaceous open slope, s. side Bayou D'Arbonne, 1 June 1963, *Kral 17280*.

Previously reported from Louisiana, but certainly infrequent and a record for the Parish.

Adiantum pedatum L.

LOUISIANA. UNION PAR.: ca. 4 mi. s.w. Farmerville on shaded sandy loam of bluff above Bayou D'Arbonne, 30 May 1963, *Kral 17264*.

Previously reported from Louisiana, but from the bluff regions along the Mississippi. Locally abundant in the loess in the vicinity of Vicksburg and Natchez, Mississippi. Certainly a record for Union Parish, over 100 miles to the west.

Festuca dertonensis (All.) Aschers. & Graebn.

LOUISIANA. Ouachita Par.: 15 mi. s.w. West Monroe; occasional on moist sandy clay of edge of beech bottom, 1 May 1959. *Kral 8756:* 3 mi. n. Schwartz on exposed sandy clay of open oak-pine woods, 24 Apr. 1959, *Kral 8642*.

Considered by Hitchcock (1950) as a waif in the eastern United States. Hitherto reported from Texas, Florida and Virginia but not from Louisiana.

Festuca magalura Nutt.

LOUISIANA. Ouachita Par.: n.w. side West Monroe along Arkansas Road; common on sandy roadbank, 10 April 1959, *Kral 8447;* 7 mi. s.s.w. West Monroe; frequent on sandy clay of railroad embankment, 1 May 1959, *Kral 8735*. LINCOLN PAR.: Ruston; sands and gravels of railroad grade, 15 April 1963, *Kral 16738*.

Sacciolepis indica (L.) Chase.

FLORIDA. FRANKLIN CO.: Lanark Station; black peat-muck of pineland ditch, 23 Sept. 1964, *Kral 23006*. GULF CO.: roadside ditch bordering flatwoods just s. of Wewahitchcka, *Godfrey & Clewell 62627*. MANATEE CO.: 19 mi. e. Bradenton on sandy peat of pineland savanna-bog, 21 July 1963, *Kral 17959*. MARTIN CO.: 3 mi. s. Stuart on sandy peat of pine flatwoods ditch, 1 Aug. 1963, *Kral 18294*. NASSAU CO.: 4.3 mi. s. Hilliard on moist sandy peat of pineland clearing, 15 Sept. 1964, *Kral 22747*. ORANGE CO.: 15 mi. e. Orlando; sandy peat of grass-sedge bog; bases decumbent, rooting at nodes, *Kral 5444* (12 Aug. 1957). S. LUCIE CO.: 1 mi. n. Martin Co. line along US 1; sandy peat of pine flatwoods ditch, 3 Aug. 1963, *Kral 18355*. *GEORGIA*. BULLOCH CO.: ditch. 6.5 mi. s. Statesboro; bog-sandridge complex, 31 Aug. 1964, *Kral 22390*. SCREVEN CO.: roadside ditch 7 mi. s. Sylvania; bog and adjacent sandy pasture, 31 Aug. 1964. *Kral 22362*.

This species has been reported from the Carolinas and Georgia, but not from Florida. This adventive appears to be making itself rapidly at home in the gress-sedge bogs of the coastal plain.

Cyperus articulatus L.

LOUISIANA. Ouachita Par.: plupwood siding in Cheniere Brake ca. 7 mi. s.w. West Monroe, 9 June 1964, *Kral 20347*.

This sedge is common on more brackish soils toward and along the Louisiana coast, but is an unusual find this far north in the state; found here in association with *Lythrum lineare L. (Kral 20343)* and *Cyperus acuminatus* Torr. & Hook. *(Kral 20342).*

Cyperus cayennensis (L.) Britton.

FLORIDA. ESCAMBIA CO.: sandy roadbank on Escambia County side of Perdido River, w. of Pensacola, 8 July 1963, *Kral 17709.*

Hitherto not reported from east of Louisiana.

Hemicarpha aristulata (Coville) Smyth.

FLORIDA. Charlotte Co.: 15 mi. n.n.w. Fort Myers; rare on moist sandy peat of roadside ditch, 29 July 1958, *Kral 7533b.*

Argument exists as to the distinctness of this species, some workers assigning it to *Hemicarpha micrantha* (Vahl.) Britt. as a variety (var. *aristulata* Cov.). It is primarily distinguished by its long-tapering, recurved bracts; I inadvertently collected it along with *H. micrantha* and did not for some time recognize the find. This entity has not previously been reported from east of Missouri.

Scirpus cubensis Poepp. & Kunth.

LOUISIANA. JACKSON PAR.: Chatham Lake, Chatham; forming floating mats in shallow water of lake, 1 Nov. 1963, *Kral 19427.*

Previously reported from Louisiana, but certainly rare within its range. (According to Small (1933), a native of the tropics and occurring in the U.S. from La. to Fla.) However, a good find for so far north in Louisiana.

Carex jamesii Schwein.

LOUISIANA. CALDWELL PAR.: Columbia; occasional on loam of oak-beech forested slope, 1 May 1959, *Kral 8773.*

Not previously reported from south of Missouri.

Xyris ambigua Beyr.

LOUISIANA. UNION PAR.: bog 1 mi. n. Bernice, 5 July 1965, *Kral 24560.*

A common *Xyris* of pine flatwoods southward in the state; however, this is a record from close to the Arkansas line and an indication that *X. ambigua* may soon be added to the Arkansas flora. Certainly there are habitats just as favorable in southern Arkansas.

Xyris drummondii Malme.

ALABAMA. BALDWIN CO.: 9.8 mi. n.e. Bay Minette in flatwoods bog, 6 Sept. 1965, *Kral 25933.* ESCAMBIA CO.: 2.2 mi. s.w. Brewton; seepage bog in longleaf pine, 6 Sept. 1965, *Kral 25951.* WASHINGTON CO.: 5.0 mi. s. Tibbie in seepage bog, 6 Sept. 1965, *Kral 25896. GEORGIA.* BRANTLEY CO.: 2 mi. s. Nahunta on wet exposed sandy peat of flatwoods, 15 Sept. 1964, *Kral 22797.*

This diminutive perennial species is probably much more abundant than its scarcity in collections would indicate. Hitherto not reported from the above-mentioned states.

Xyris difformis Chapm. var. *floridana* Kral.

LOUISIANA. WASHINGTON PAR.: just n. Varnado on wet sandy clay of ditch through pine flatwoods, 5 Sept. 1963, *Kral 19385*.

This variety, easily recognized by its maroon tinted leaf bases and its farinose seed, was identified by J. K. Small as *X. serotina* Chapm., a totally different species. However, in that the Manual includes neither entity for Louisiana, it is safe to admit the collection as a record.

Xyris iridifolia Chapm.

ARKANSAS. OUACHITA CO.: margins of Bragg Lake, Bragg City, P. O. Chidester, 9 Sept. 1964, *D. Demaree 51312*.

The first known collection of this species from Arkansas, although it is fairly common in southern Louisiana and Texas.

Xyris serotina Chapm.

ALABAMA. BALDWIN CO.: flatwoods ditch, 5.4 mi. s. Foley, 25 Sept. 1964, *Kral 23133*. *GEORGIA*. LIBERTY CO.: just n. of Liberty Co. line vicinity Walthourville, 17 Aug. 1963, *Kral 18853*. LONG CO.: 21 mi. n.w. Darien on wet sandy peat of low pine flatwoods in Altamaha River basin, 17 Aug. 1963, *Kral 18881*. McINTOSH CO.: 3 mi. s. Eulonia on heavy sandy clay peat of pothole in oak-pine barrens, 14 Aug. 1963, *Kral 18683;* 10 mi. w.n.w. Darien on moist to wet sandy peat of potholes and ditch in low pine flatwoods, 15 Aug. 1963, *Kral 18746 A. NORTH CAROLINA*. COLUMBUS CO.: 11 mi. s.e. Whiteville on wet sandy peat of ditch in longleaf pine flatwoods, 24 Aug. 1963, *Kral 19035*. *SOUTH CAROLINA*. BEAUFORT CO.: 9 mi. n. Savannah on black sandy peat of cypress-pine flatwoods, 21 Aug. 1963, *Kral 18926*.

This species, long ago described by Chapman, is distinct in being the only farinose seeded *Xyris* that lacks maroon or red pigmentation in its leaf bases. It is similar in size and habit to *X. difformis* and has sometimes been so identified. Not previously known from the above-mentioned states.

Xyris stricta Chapm.

GEORGIA. BRYAN CO.: s. side Richmond Hill on wet peat of ditch through wet pine flat woods, 17 Aug. 1963, *Kral 18813*. COLQUITT CO.: 6 mi. s.e. Moultrie on ditch through pine-palmetto flatwoods, 24 Aug. 1964, *Kral 22099*. IRWIN CO.: 2 mi. w.s.w. Ocilla on wet peat by pineland pond, 25 Aug. 1964, *Kral 22155*. LIBERTY CO.: just n. of Liberty Co. line vicinity Walthourville on peaty margin of cypress-gum swamp, 17 Aug. 1963, *Kral 18852*. LONG CO.: 11 mi. w. Eulonia on moist to wet sandy clay peat of dried up pothole in pine flatwoods, 14 Aug. 1963, *Kral 18711;* 21 mi. n.w. Darien on wet sandy peat of low pine flatwoods in Altamaha River basin, 17 Aug. 1963, *Kral. 18882*. McINTOSH CO.: 3 mi. s. Eulonia on heavy sandy clay peat of pothole in oak-pine barrens, 14 Aug. 1963, *Kral 18682;* 10 mi. w.n.w. Darien on wet sandy peat of ditch in low pine flatwoods, 15 Aug. 1963, *Kral 18747;* Darien, on peaty bottom

of dried up cypress-pond pine slough, 21 Aug. 1963, *Kral 18891. SOUTH CAROLINA.* BEAUFORT CO.: 9 mi. n. Savannah on wet sandy peat of ditch in pine-cypress flatwoods, 21 Aug. 1963, *Kral 18922.* GEORGETOWN CO.: 315 mi. s. Andrews on sandy peaty ditch in pineland savanna, 28 Aug. 1963, *Kral 19160.* HAMPTON CO.: 4 mi. s. Estill on peaty edge of cypress-gum swamp, 29 Aug. 1963, *Kral 19219.* JASPER CO.: 13 mi. n. Hardeeville on peaty clearing in low pine flats, 21 Aug. 1963, *Kral. 18901.*

This long overlooked species (treated however by Small as distinct), has not been reported previously from the above states.

Xyris scabrifolia Harper.

ALABAMA. BALDWIN CO.: 4 mi. e. Elberta in sphagnous pineland bog, 25 Sept. 1963, *Kral 23158.*

This, the rarest of U.S. *Xyris* and a suspected hybrid, has not previously been found in Alabama.

Eriocaulon texense Korn.

ALABAMA. WASHINGTON CO.: piney woods bog 7.8 mi. n. Citronelle along Ala. 17, 8 May 1966, *Kral 26468;* seepage area, Tibbie, 8 May 1966, *Kral 26483;* Bassett Creek bottoms just n. Chatom along Ala. 17, 9 May 1966, *Kral 26602. LOUISIANA.* BEAUREGARD PAR.: 7 mi. e. DeRidder in peaty depression in longleaf pine savanna bog, 29 Apr. 1963, *Kral 16992;* 5 mi. s. Singer on muck of sphagnous sarracenia bog, 9 May 1963, *Kral 20158.* VERNON PAR.: ca 3 mi. s. Ft. Polk; seepage area of sandy peat, depression in longleaf pine hills, 30 Apr. 1963, *Kral 17233;* ca. 4 mi. s. Ft. Polk, 29 Apr. 1963, *Kral 16772;* ditch between Rosepine and Ludington, 9 May 1963, *Kral 20078.*

This *Eriocaulon* was not previously known from outside Texas, but more localities for it are being found each spring in the Gulf states. Dr. Shinners has collected it from Mobile and Baldwin counties in Alabama and George County in Mississippi; Mr. McDaniel has collected it from northwestern Florida.

Chamaelirium luteum (L.) Gray

LOUISIANA. LINCOLN PAR.: ca. 4 mi. w. Ruston on loam of beech forested draw; flowers white, 15 Apr. 1963, *Kral 16742.*

Not previously reported from south of Arkansas.

Erythronium albidum Nutt.

TEXAS. SABINE CO.: 4.7 mi. w. Geneva; beech-oak-pine wood above Palo Gaucho Creek; sandy loam pockets in sandstone outcrop area, 18 Mar. 1965, *Kral 23362.*

Not a usual find in eastern Texas and quite distinct from the var. *coloratum* which is so frequent around Dallas. Mentioned not as a record for the state but because of its proximity to similar habitats in Louisiana.

Erythronium rostratum. Wolf.

LOUISIANA. BIENVILLE PAR.: ca. 4 mi. e.s.e Gibsland in beech

maple bottom, 23 Mar. 1963, *Kral 16367;* 0.9 mi. e. Gibsland on high banks of hardwood bottom, 17 Mar. 1965, *Kral 23340.* CLAIBORNE PAR.: 5 mi. n.n.e. Arcadia on shaded high spot in alluvial bottom, 29 Mar. 1963, *Kral 16415.* LINCOLN PAR.: 2.5 mi. n.w. Vienna on higher alluvial terraces of mesic-forest Cypress Creek bottom, 20 Mar. 1963, *Kral 16349. TEXAS.* SABINE CO.: 4.7 mi. w. Geneva; beech-oak-pine wood above Palo Gaucho Creek; silty bottomland, *Kral 23369.* SAN AUGUSTINE CO.: ca. 8 mi. n.e. San Augustine along branch of Paulo Gaucho Creek on sandstone outcrop area under beech-oak-hickory; soil a sandy silt loam, *Kral 23355.*

This species is previously known from Louisiana, the Lincoln Parish locality has already been cited. However, it is much more abundant in the northern parishes of Louisiana than collection records indicate. Yellow *Erythronium* has not, according to Dr. Shinners, been known from Texas save as a sight record. In the above-mentioned Texas localities it is so abundant as to cover whole slopes.

Trillium recurvatum Beck.

LOUISIANA. CADDO PAR.: bluffs at Ft. Humbug, Shreveport, 13 Mar. 1964, *Kral 19449;* 17 Mar. 1965, *Kral 23388.* CLAIBORNE PAR.: ca. 12 mi. n. Arcadia in alluvial bottom: T20N, R5W, Sec 33: overstory of beech, oak, maple, 29 Mar. 1963, *Kral 16420;* 14 Mar. 1965, *Kral 23337;* Sugar Bayou bottoms e. Aycock, T20N, R5W, Sec 27 on higher alluvium of hardwood bottom, 29 Mar. 1963, *Kral 16412;* 5 mi. n. Gibsland along Leatherman Creek; infrequent in alluvial woods, 22 Mar. 1964, *Kral 19489.* LINCOLN-CLAIBORNE PARS.: 15.6 mi. n.w. Vienna along La. 146; sandy silt loam of Sugar Bayou, a high spot, 14 Mar. 1965, *Kral 23338.* UNION PAR.: 4 mi. s.e. Farmerville; higher alluvium of small, hardwood-shaded, creek bottom, 12 Apr. 1963, *Kral 16679.*

Although this species has been reported from Louisiana, actual specimens of it appear hard to come by. It does not appear to be able to stand grazing; ungrazed woodlands along Sugar Bayou have an abundance while the same habitat, if grazed, is devoid of this *Trillium.* It was doubtless much more abundant in alluvial situations in northern Louisiana before the advent of such disturbance.

Uvularia sessilifolia L.

LOUISIANA. LINCOLN PAR.: 2 mi. w.n.w. Ruston on sandy alluvium of stream-bank in beech woods, 27 Mar. 1963, *Kral 16401;* 15 Apr. 1963, *Kral 16743;* 2 mi. n. Ruston in beech bottom on low rises, 12 Apr. 1963, *Kral 16652.*

Previously reported from as far south as Natchitoches, and from Lincoln Parish by Dr. John Moore, but mentioned here to cover a large distribution soon to go out.

Nolina atopocarpa Bartlett.

FLORIDA. FRANKLIN CO.: 6 mi. below Sumatra; sandy peat of pine

flatwoods, *Kral & Godfrey 15049.*

Of such limited distribution (pinelands, eastern peninsular Florida) that this represents an interesting extension of known range.

Smilax herbacea L. var. *lasioneuron* (Hook.) DC.

LOUISIANA. LINCOLN PAR.: ca. 2 mi. n.w. Vienna; a vine on sandy railroad embankment, 15 Apr. 1963, *Kral 16725.*

Hitherto not reported west of Alabama in the coastal plain, and a record for Louisiana for the species.

Iris verna L.

ALABAMA. MOBILE CO.: 20 mi. s.e. Citronelle in sandy longleaf pine-turkey oak hills by Ala 41, 4 Apr. 1966, *Kral & Henderson 26188.* WASHINGTON CO.: 0.6 mi. s. Tibbie along US 17 in pine flatwoods, 5 April. 1966, *Kral & Henderson 26197.*

Already reported from Alabama, but mentioned for its southerly location and proximity to northwestern Florida from which there are sight records for the species.

Corylus americana Walt.

LOUISIANA. UNION PAR.: tall shrubs in recently cut over bottom ca. 3 mi. s.s.e. Farmerville above Lake D'Arbonne on Farmerville-Monroe Rd., *Kral 16322* (flowers, 28 Feb. 1963); 1 June 1963, *Kral 17284; Kral 23220* (fruit).

Collected by Dr. John Moore (Louisiana Tech) from Morehouse Parish and reported on that basis by John Thieret (in Sida). Thus the above collections represent a Parish record for this northern shrub which is so rare in Louisiana.

Quercus borealis Michx. f.

LOUISIANA. UNION PAR.: 3 mi. s. Farmerville; tree ca. 80', 12" d.b.h., only lower bark deeply furrowed, quickly becoming gray with broad, smooth, long flat ridges above, 1 June 1963, *Kral 17283.*

First reported from Louisiana by Cocks, a record being sent to Prof. Sargent. This however is a record from east of the Mississippi River while the above is the first report from west of the river in Louisiana. This collection came from amongst a rather large number of trees, these mainly confined to the steep bluffs above the Bayou D'Arbonne. I visited the locality for three successive autumns in search of mast, but was unable to obtain any. However, on the basis of leaf, bark and twig characteristics, this is definitely Northern Red Oak, being quite distinct from its cohabitant, *Q. shumardii*, in its reddish, lustrous twigs and its reddish buds. (*Q. shumardii* has grayish twigs and buds and very different, deeply lobed, leaves). Reproduction of the species is almost non-existent. It must produce only enough seedlings (during extremely cold cycles) to barely maintain populations in northern Louisiana.

Ranunculus arvensis L.

MISSISSIPPI. BOLIVAR CO.: fine soil of roadbank 2 mi. s. Winston-

ville, 17 Apr. 1963, *Kral 19916.*

Hitherto unreported from Mississippi. Reported in Britton & Brown (1952) as a native of Europe and occasionally introduced along the Atlantic coast. The above find is a common roadside weed in the vicinity of Winstonville.

Thalictrum mirabile Small.

ALABAMA. FRANKLIN CO.: 1.2 mi. n. Hackleburg on dripping sandstone bluff above Bear Creek, 7 May 1966, *Kral 26455.*

So far as I can determine known only from the type locality, namely "sandstone bluffs, Little Mt. in the Appalachian Plateau, Alabama." This therefore represents a significant increase in known range of the species within Alabama. A most unusual plant, growing in the shade of dripping sandstone cliffs. Very distinct in its pinkish flowers, having as its closest relative *T. clavatum* DC. of the higher parts of the Appalachian province.

Sanguinaria canadensis L.

LOUISIANA. BIENVILLE PAR.: ½ mi. s. Gibsland on sandy loam of hardwood shaded ravine, 23 Mar. 1963, *Kral 16366;* ca. 4 mi. s.s.e. Gibsland in beech-maple bottom, 23 Mar. 1963, *Kral 16368;* 17 Mar. 1965, *Kral 23339. TEXAS.* SABINE CO.: 4.7 mi. w. Geneva; beech-oak-pine woods above Palo Gaucho Creek in sandy loam pockets in sandstone outcrop area, 18 Mar. 1965, *Kral 23367.* SAN AUGUSTINE CO.: ca. 8 mi. n.e. San Augustine along branch of Palo Gauch Creek on sandstone outcrop area under beech-oak-hickory; soil a sandy loam, 18 Mar. 1965, *Kral 23350.*

Previously reported from Louisiana (C. Dormon and John Moore; a specimen from Bienville Parish collected by Dr. Moore is in the Herbarium, Louisiana Polytechnic Institute) but mentioned here to cover added localities. Mentioned by Dr. Shinners as occurring in Texas, but cited here to add distributional data on the species.

Dentaria laciniata Muhl. ex Willd.

LOUISIANA. CADDO PAR.: bluffs above Red River at Ft. Humbug, Shreveport, *Kral 19448;* 17 Mar. 1965, *Kral 23387.* CLAIBORNE PAR.: Sugar Bayou bottoms e. if Aycock, the plants abundant on higher alluvium under mixed hardwoods, 29 Mar. 1963, *Kral 16413.* LINCOLN PAR.: ca. 5 mi. n. Ruston along Cypress Creek in beech bottom, 26 Mar. 1963, *Kral 16397.* UNION PAR.: sandy silt loam of small creek bottom s. of Farmerville along Bayou D'Arbonne, 16 Mar. 1963, *Kral 16344. TEXAS.* SABINE CO.: 4.7 mi. w. Geneva; beech-oak-pine wood above Palo Gaucho Creek; sandy loam pockets in sandstone outcrop area, 18 Mar. 1965, *Kral* 23366 SAN AUGUSTINE CO.: ca. 8 mi. n.e. San Augustine along branch of Palo Gaucho Creek on sandstone outcrop area under beech-oak-hickory; soil a sandy loam, 18 Mar. 1965, *Kral 23350.*

Previously reported both from Louisiana and Texas, but mentioned

here to add known localities in an area where such are scarce. *Lilium Michauxii* Poir., is here reported as a sight record from the San Augustine Co. locality; the plants were in abundance in the area, but were barely above the ground.

Hydrangea arborescens L.

LOUISIANA. UNION PAR.: ca. 4 mi. s.w. Farmerville on shaded sandy loam of bluff above Bayou D'Arbonne; a shrub, fls. white, 30 May 1963, *Kral 17266*.

Frequent on the loess in the vicinity of Vicksburg and Natchez, Mississippi, and reported from Louisiana. However, this may well represent a western record for the species in Louisiana.

Saxifraga virginiensis Michx.

LOUISIANA. UNION PAR.: 3 mi. s. Farmerville; abundant locally on moist shaded outcrop of ferrugineous shale, *Kral 8251* (6 Mar. 1959); 6 Mar. 1963, *Kral 16394*.

This small herb has not previously been reported from further south than the interior highlands of Arkansas. Dr. Steyermark, in his treatment in *Brittonia* of the *Saxifraga virginiensis* complex, categorically stated that the species did not occur souh of Arkansas. However, these Louisiana plants are no different in character than those of the Ozarks or Appalachians.

Cassia deeringiana Small & Pennell.

FLORIDA. CALHOUN CO.: frequent on drier sandy peat of savanna 5 mi. w. Blountstown, 6 June 1957, *Kral 4818*.

An extension of known range northward from southern peninsular Florida and the Keys. Probably more frequent than present sparse records indicate in that the plants very strongly resemble the common *Cassia, C. fasciculata*, but for their very large, woody, rootstocks.

Hypericum brachyphyllum (Spach) Steud.

LOUISIANA. VERNON PAR.: grass-sedge bog 2 mi. e. LaCamp, 12 Sept. 1962, *Kral 15803*.

A first report from Louisiana; the plants are not infrequent in northwest Florida.

Epigaea repens L.

ALABAMA. WASHINGTON CO.: 2.5 mi. w. Chatom along US 84; oak-pine woods, sandy soil, 4 Apr. 1965, *Kral & Henderson 26204*. *MISSISSIPPI*. WAYNE CO.: ravine above Chickasawhay River, 14.2 mi. w. Alabama line along US 84; sandy loam of magnolia-spruce pine stand, 22 Mar. 1965, *Kral 23401*.

Reported in Small (l.c.) from both Alabama and Mississippi, but infrequent enough in the Gulf Coastal Plain to warrant mention here.

Salpichroa origanifolia (Lam.) Baill.

LOUISIANA. LINCOLN PAR.: Ruston, Louisiana; a garden weed, 5 July 1959, Mr. Herran.

This weed, treated by Small as *Perizoma rhomboidea* (Hook.) Small, has been known previously only from Florida and the Carolinas. It is a native of South America.

Lycopus virginicus L.

LOUISIANA. LINCOLN PAR.: 4.5 mi. e. Ruston on sandy clay of stream bottom, 4 Sept. 1962, *Kral 15726;* 10 mi. e. Ruston in oak-virginia bay botton, sandy clay soil, 4 Sept. 1962, *Kral 15782.*

Stated by Henderson in his current revision of the genus as occurring west into Texas, nonetheless of infrequent occurrence in the Gulf Coastal Plain.

Wahlenbergia marginata (Thunb.) DC.

LOUISIANA. VERNON PAR.: ca. 3 mi. s. Ft. Polk; longleaf pine and hills and roadbank, 29 May 1963, *Kral 17237.*

This plant is adventive in many of the southern states (Florida, Alabama, Mississippi, the Carolinas) and is here reported to add Southwestern Louisiana to its range.

Eupatorium aromaticum L.

LOUISIANA. LINCOLN PAR.: ditchbank along Interstate 20, 10 mi. e. Ruston, 15 Sept. 1962, *Kral 16020.*

Reported from Louisiana by Fernald (1950), but evidently rare there; not reported from that state by Gleason (1952).

Solidago hispida Muhl.

LOUISIANA. UNION PAR.: ca. 4 mi. s.e. Farmerville; steep sided, heavily shaded sandstone-shale slope, 16 Oct. 1963, *Kral 19418.*

Solidago juncea Ait.

FLORIDA. LEON CO.: occasional on red sandy clay in shortleaf pine forest 1 mi. n. Tallahassee along Meridian Road; flowers pale yellow, *Kral 3633* (9 Oct. 1956). Seemingly this plant is not reported from south of Georgia.

Coreopsis gladiata Walt.

LOUISIANA. NATCHITOCHES PAR.: fine sandy soil of mature longleaf-loblolly stand, 2 Nov. 1962, *Kral 16178.*

Presently known only from as far west as Mississippi.

Bidens vulgata Greene.

LOUISIANA. NATCHITOCHES PAR.: fine sandy soil of depression in mature longleaf loblolly stand, ca. 4 mi. e. Bellwood, 2 Nov. 1962, *Kral 16187.*

Considered rare in the coastal plain and, in the longitude of Louisiana, not reported south of Missouri.

Ratibida columnifera (Nutt.) Woot. & Standl.

LOUISIANA. JACKSON PAR.: n.e. side Eros; sandy clay of roadbank, locally abundant, 9 June 1964, *Kral 20349.*

Occasional as an adventive in the Gulf Coastal Plain, but heretofore not reported for Louisiana.

Senecio aureus L.

TEXAS. SABINE CO.: 4.7 mi. w. Geneva; beech-oak-pine wood above Palo Gaucho Creek; sandy loam pockets in sandstone outcrop area, 18 Mar. 1965, *Kral 23365.*

Some difference in interpretation may exist here, in that my plants may be referred to *Senecio obovatus* Muhl.[1] However, these plants, in character of basal leaves, rosette leaves, and in general appearance differ little from the *Senecio aureus* I have collected from wet woods in western Virginia. In my opinion, *Senecio obovatus* is invariably on higher drier sites than is the case with *S. aureus.* In the gulf coastal plain this also seems to be the case. For example, *S. obovatus* is not infrequent on mesic woodland soils in northern Florida; it is extremely abundant in the woods of Marianna Caverns State Park. *S. aureus* is also in Florida but rare, thus far being found only in wet woodlands in the vicinity of Quincy, Gadsden Co., Florida. To the west in Louisiana *S. obovatus* is a plant of rich upland woods. The Senecios of the alluvial woods further west in eastern Texas need reappraisal; the above mentioned collection is noteworthy.

Carduus nutans L.

LOUISIANA. LINCOLN PAR.: N side Ruston on sandy embankment of Interstate 20, 1 June 1963, *Kral 17292.*

Previously reported from Louisiana by Shinners, but a parish record. Frequent on the disturbed alluvium of the Red River near Shreveport. This plant, a pernicious abundant weed of interior provinces eastward, appears locally in northern Louisiana on recently constructed road shoulders but does not seem to persist.

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[1] After Dr. Kral's paper was written a duplicate of this collection at SMU was identified by Dr. T. M. Barkley as a form ("rotundus phase") of S. *obovatus.*—*Editor's note.*