Proceedings of the Iowa Academy of Science

Volume 85 | Number Article 3

1978

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Recommended Citation

Lammers, Thomas G. and Van Der Valk, A. G. (1978) "A Checklist of the Aquatic and Wetland Vascular Plants of Iowa: II. Monocotyledons, Plus a Summary of the Geographic and Habitat Distribution of All Aquatic and Wetland Species in Iowa," *Proceedings of the Iowa Academy of Science, 85(4),* 121-163.
Available at: https://scholarworks.uni.edu/pias/vol85/iss4/3

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Proc. Iowa Acad. Sci. 85(4): 121-163, 1979

A Checklist of the Aquatic and Wetland Vascular Plants of Iowa:
II. Monocotyledons, plus a summary of the geographic and habitat distribution of all aquatic and wetland species in Iowa.[1]

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A total of 188 monocotyledons are considered aquatic or wetland species in Iowa. For each species, information is given on its synonymy, habitat, frequency of occurrence and distribution (including a distribution map). This information was obtained primarily from published floristic surveys. The geographic and habitat distributions of all aquatic and wetland species in Iowa are also discussed.
INDEX DESCRIPTORS: Aquatic plants, geographical distribution, Iowa, flora, monocotyledons, wetlands, marsh, swamp, fen, hanging bog.

Part II is an annotated checklist of the aquatic and wetland monocotyledons of Iowa. As was Part I (Lammers and van der Valk 1977), Part II is based primarily on information contained in a series of floristic surveys of Iowa done in the 1950's and 1960's, chiefly by students of Dr. Robert F. Thorne at the University of Iowa (see Eilers 1975). This information has been supplemented by the examination of specimens of relevant taxa in the herbarium at Iowa State University. Criteria for including species in the checklist and in compiling the distribution maps for each species are given in Part I. In Part II, a few species unintentionally left out of Part I are included in an Addendum. Also included in this Addendum are the correct names of several species misidentified in Part I.

The families in the checklist are arranged according to Cronquist (1968). Genera and species, however, are arranged alphabetically and an index is provided to facilitate finding a family or genus. All introduced species in the checklist are indicated by an asterisk. The nomenclature follows Gleason and Cronquist (1963), except for the Cyperaceae and Poaceae where Gilly (1946) and Pohl (1966) are followed respectively. In a few cases, Gleason and Cronquist's (1963) nomenclature is not used. An authority is cited whenever we have substituted a more recent or appropriate name for those found in Gleason and Cronquist (1963).

Part II also contains a summary of the geographical distributional patterns of all the aquatic and wetland species in Iowa and brief descriptions of Iowa's wetland types. The latter contain a list of the more common and (or) characteristic species of each wetland type. The selection of species included in these descriptions is based on published information whenever possible or on our own field experience.

IV. MAGNOLIOPHYTA
B. LILIATAE
ALISMACEAE

Alisma subcordatum Raf. (*A. plantago-aquatica* of auth., not L.) Map 1-A
Common throughout Iowa; marshes and shallow water of ponds, lakes, sloughs, swales, and marshes.
According to Eilers (1971), the report of *A. gramineum* K. C Gmelin from Linn county is based on a misidentified specimen of *A. subcordatum*.

Echinodorus bertoroi (Sprengel) Fassett var. *lanceolatus* (Englm.) Fassett (*E. rostratus* (Nutt.) Englm.; *E. cordifolius* of auth., not Griseb.) Map 1-B
Rare, occurring primarily along the Mississippi and Missouri rivers in Iowa; ponds, lakes, oxbows, marshes, and sloughs. This treatment follows Fassett (1955).

Sagittaria cuneata Sheld. Map 1-C
Infrequent in northern Iowa; marshes, ponds, lakes, and sloughs.

S. engelmanniana J. G. Smith ssp. *brevirostra* (Mack. & Bush) Bogin (*S. brevirostra* Mack. & Bush) Map 1-D
Frequent across Iowa; muddy margins and shallow water of lakes, ponds, marshes, swales, sloughs, and streams.

S. graminea Michx. var. *graminea* Map 1-E
Infrequent, most frequently reported from the drainage of the Des Moines, Skunk, and Cedar-Iowa River systems; wet margins and shallow water of ponds, lakes, swales, marshes, and sloughs.

S. graminea var. *cristata* (Englm.) Bogin (*S. cristata* Englm.)
EMMET: shallow water at margin of Neller Lake east of Armstrong, Cratty, 1881, 1882, 1884, and 1891 (ISC). This is the location from which the type specimen of *S. cristata* was collected by Cratty.

S. latifolia Willd. Map 1-F
Very common statewide; margins and shallow water of ponds, lakes, marshes, and swales.

S. montevidensis C. & S. ssp. *calycina* (Englm.) Bogin (*S. calycina* Engelm.; *Lophotocarpus calycinus* (Englm.) J. G. Smith) Map 1-G
Infrequent to rare in southern Iowa, along the Mississippi and Missouri rivers, and in the Lakes Region; shallow water and margins of ponds, lakes, and marshes.

S. rigida Pursh Map 1-H
Infrequent, primarily in the eastern half of the state; margins and shallow water of ponds, lakes, marshes, and sloughs.

HYDROCHARITACEAE

Anacharis canadensis (Michx.) Rich. (*Elodea canadensis* Michx.; *E. iowensis* Wylie; *E. planchonii* Caspary) Map 2-A
Infrequent in lakes and ponds of northern Iowa.

A. nuttallii Planch. (*A. occidentalis* Pursh.; *Elodea nuttallii* (Planch.) St. John) Map 2-B
Infrequent across the state, but evidently absent from most of the northwest third; quiet water of ponds, lakes, and sloughs.

Vallisneria americana Michx. (*V. spiralis* of auth., not *L.*)Map 2-C
Infrequent to rare, primarily in the lakes of northern Iowa, but also collected from backwaters of the Mississippi River in Scott and Lee counties in the 1890's.

1) Journal Paper No. J-9068 of the Iowa Agriculture and Home Economics Experiment Station, Ames, Iowa. Project 2071.

JUNCAGINACEAE

Scheuchzeria americana (Fern.) G. N. Jones (*S. palustris* L. var. *americana* Fern.) Map 2-D
EMMET: Armstrong, Cratty, 1884 (IA, ISC). A northern species of fens and bogs, now probably extinct in Iowa. The authors follow Jones and Fuller (1955) in considering the American plants specifically distinct from the Eurasian.

Triglochin maritima L. Map 2-E
CLAY: hanging bog, s.16 Logan twp., Hayden 8033, 1937 (ISC). DICKINSON: Silver Lake fen, Thorne 9794, 1950 (IA); same station, Lammers 567, 1975 (ISC). EMMET: Armstrong, Cratty, 1883 (IA); fen 4 miles north of Estherville, Hayden 727, 1934 (ISC). HANCOCK: *Sphagnum* mat in Dead Man's Lake, Pilot Knob State Park, Thorne and Grant, 1954 (IA). PALO ALTO: marsh around cold spring, s.24 Highland twp., Hayden 723, 1936 (ISC). WINNEBAGO: peat bog 1 mile south of Lake Mills, s.15 Center twp., Thorne 11068, 1952 (IA).

T. palustris L. Map 2-F
CLAY: bogs along creek near Dickens, Barnes and Miller, 1895 (IA). DICKINSON: Silver lake fen, Thorne 10813, 1952 (IA). EMMET: hanging bog 4 miles north of Estherville, Hayden 726, 1934 (ISC). PALO ALTO: hillside spring 1 mile northeast of Graettinger, Hayden 8916, 1940 (ISC); fen 4½ miles east of Ruthven, Thorne 13588, 1953 (IA).

NAJADACEAE

Najas flexilis (Willd.) Rostk. & Schmidt. Map 2-G
Infrequent, scattered throughout the northeastern third of the state; submersed in shallow to deep water of ponds, lakes, and sloughs.

N. guadalupensis (Spreng.) Magnus Map 2-H
Infrequent in extreme southern and extreme northern Iowa; submersed in shallow and deep water of ponds, lakes, and sloughs.

Potamogeton amplifolius Tuckerm. Map 3-A
Rare to infrequent in the lakes of northern Iowa, locally southward to Tama and Muscatine counties.

P. berchtoldii Fieber Map 3-B
ALLAMAKEE: Mississippi River slough 2 miles north of Lansing, Hartley 7609, 1959 (Univ. Wisc, LaCrosse). CLAY: Dewey's Pasture, s.25 Lake twp., Thorne 13199, 1959 (IA). DICKINSON: pond near Lake Okoboji, Shimek, 1915, (IA); Manhattan Pond, s.14 Lakeville twp., Thorne 13015, 1953 (IA). HANCOCK: Dead Man's Lake, Pilot Knob State Park, Thorne 14580, 1954 (IA). MUSCATINE: Cedar River slough near Salisbury Bridge, Reppert, 1894 (IA). PALO ALTO: Silver Lake, s.32 Lake twp., Hayden 8641, 1940 (ISC).
Gleason and Cronquist (1963) consider this to be a form of *P. pusillus* L. We follow Beal and Monson (1954) in retaining *P. berchtoldii* as a distinct species.

**P. crispus* L. Map 3-C
ALLAMAKEE: Mississippi River near State Fisheries building, Snead, 1944 (ISC); Mississippi River slough 2 miles north of Lansing, Hartley 7600, 1959 (IA, ISC). CLINTON: deep water of Deer Creek under railroad bridge, 4 miles north of Clinton, Drews, 1968 (ISC). DES MOINES: shallow water of Dumbbell Lake, a cut-off Mississippi River slough 2½ miles north of Burlington, s.15 Tama twp., Lammers 1017, 1977 (ISC). DUBUQUE: Shallows of the Mississippi River (s. 29 T91N R1E), Hartley 8977, 1959 (IA); GREENE: Spring Lake,Wooten 2071, 1968 (ISC). JACKSON: shallow pond near the Mississippi River, Cooperrider, 1520, 1956 (IA). SCOTT: basins of the Mississippi River at Lock 14, Guldner, 1955 (DPM). TAMA: marsh at head of lake, Union Grove State Park, south of Gladbrook, Eilers 5274, 1963, (IA).
A Eurasian species introduced and naturalized throughout much of North America, in Iowa especially prevalent along the Mississippi River.

P. diversifolius Raf. (*P. capillaceous* Poir.; *P. dimorphus* of auth., not Raf.) Map 3-D
Infrequent, southeastern Iowa; lakes, ponds, and sloughs.

P. epihydrus Raf. Map 3-E
Rare in ponds and lakes of northern Iowa.

P. foliosus Raf. Map 3-F
Common, statewide; ponds, lakes sloughs.

P. friesii Rupr. Map 3-G
Rare; lakes, ponds, and sloughs of northwestern and central Iowa.

P. gramineus Raf. (*P. graminifolius* (Fries.) Feyer) Map 3-H
Rare, primarily in the Lakes Region, but also known from central Iowa; lakes, ponds, and sloughs.

P. illinoensis Morong. (*P. angustifolius* of auth., not C. & S.; *P. lucens* of auth., not L.) Map 4-A
Infrequent across Iowa in ponds, lakes, and sloughs. The type collection from which this species was described was made in Henderson county, Illinois, just across the Mississippi River from Iowa, by Patterson in the 1870's.

P. natans L. Map 4-B
Infrequent in the Lakes Region, scattered elsewhere in northern and eastern Iowa; ponds, lakes, and sloughs.

P. nodosus Poir. (*P. americanus* C. & S.; *P. fluitans* Roth.; *P. lonchites* Tuckerm.) Map 4-C
Common statewide; ponds, lakes, sloughs.

P. pectinatus L. Map 4-D
Common statewide; ponds, lakes, sloughs.

P. praelongus Wulfen Map 4-E
CERRO GORDO: Clear Lake, Arthur, 1874 (ISC). DICKINSON: Spirit Lake, Hitchcock, 1885 (ISC); Little Miller's Bay, West Okoboji Lake, Thorne 9849, 1950 (IA). EMMET: Iowa Lake, Cratty, 1895 (ISC).

P. pusillus L. (P. panormitanus Biv.) MAP 4-F
Infrequent, primarily in the Lakes Region and the southern third of Iowa; ponds, lakes, sloughs.

P. richardsonii (A. Benn.) Rydb. Map 4-G
Infrequent in the lakes of northern Iowa

P. spirillus Tuckerm. Map 4-H
HANCOCK: Forest City, Shimek, 1896 (IA). WINNEBAGO: pond north of Forest City, Cratty, 1896 (IA).

P. strictifolius A. Benn. Map 5-A
CERRO GORDO: Clear Lake, Shimek, 1896, (IA). DICKINSON: Spirit Lake, Hitchcock, 1885 (ISC).EMMET: High Lake, Wolden, 1917 (ISC). STORY: Mud Lake, Hitchcock, 1886 (ISC).

P. vaseyi Robbins Map 5-B
LINN: Coggon Bog, 2½ miles south of Coggon (s.27 Jackson twp.), Thorne 10852, 1952 (IA). LOUISA: Conesville Marsh, Oakland twp., Thorne 10677a, 1952 (IA).

P. zosteriformis Fern. Map 5-C
Infrequent, scattered in the northeastern half of Iowa; ponds, lakes, sloughs.

Zannichellia palustris L. Map 5-D
Infrequent, primarily in northeastern Iowa, but also collected in southeastern and central Iowa; ponds, lakes, and sloughs.

XYRIDACEAE

Xyris torta Sm. (*X. flexuosa* of auth.,not Muhl.) Map 5-E
CEDAR: moist sandy margin of undrained depression in sand hills on east bank of Cedar River, s. 31 Rochester twp., Hartley 9495, 1960 (IA). FAYETTE: low prairies, Wadena, Fink, 1894 (ISC). MUSCATINE: sandy swale among old wooded dunes, Lake twp.,

Thorne 10969, 1952 (IA).

JUNCACEAE

Juncus acuminatus Michx. Map 5-F
Infrequent, primarily along the Mississippi River in eastern Iowa, but also reported from Harrison and Pottawattamie counties along the Missouri River in western Iowa; wet sandy prairie swales, marshes, and pond margins.

J. alpinus Vill. Map 5-G
DICKINSON: Silver Lake fen, Anderson, 1942 (IA); same station, Thorne 13060, 1953 (IA). HARRISON: wet alluvial ground, Blair Bridge, Shimek, 1909 (IA).

J. balticus Willd. var. *littoralis* Englm. (*J. litorum* Rydb.) Map 5-H
Infrequent, scattered in eastern, central and northwestern Iowa; prairie swales, marshes, fens, bogs, and pond margins.

J. canadensis J. Gay Map 6-A
Infrequent, primarily in eastern Iowa; marshes, streambanks, and wet margins of ponds, lakes, and sloughs.

J. dudleyi Wieg. Map 6-B
Frequent throughout; marshes, sloughs, meadows, swales, bogs, and wet margins.

J. effusus L. var. *solutus* Fern. & Wieg. Map 6-C
ALLAMAKEE: floodplain of French Creek, s.7 French Creek twp., Hayden 9078, 1937 (ISC); Lansing, Snead, 1946(ISC). JOHNSON: wet sandy margin of Swan Lake, s.5 Madison twp., Lammers 985, 1977 (ISC). LEE: wet places, Fults, 1931 (ISC). LOUISA: wet sandy margin of lake at Big Sand Mound, s.4 Port Louisa twp., Guldner (DPM). MAHASKA: slough 3 miles north of Eddyville, Augustine, 1938 (ISC).

J. greenei Oakes & Tuckerm. Map 6-D
HOWARD: moist swales, Hayden Prairie, s.33 Chester twp., Eilers (IA). SCOTT: sandy marsh, s.13 Winfield twp., Guldner, 1954 (DPM). WINNESHIEK: low ground, Ft. Atkinson, Shimek, 1903 (IA).

The Winneshiek county collection was the basis for the only report of *J. vaseyi* Englm. from Iowa. The specimen was correctly identified by Beal as above (Thorne, 1956).

J. marginatus Rostk. Map 6-E
CEDAR: sandy bog near Cedar River, s.36 Rochester twp., Fay 1295, 1950 (IA). MUSCATINE. sandy pond margin, Reppert, 1892 (IA). SCOTT: sandy marsh, s.13 Winfield twp., Guldner (DPM).

J. x *nodosiformis* Fern. (*J. alpinus* Vill. x *nodosus* L.) Map 6-F
DICKINSON: Silver Lake fen, Anderson, 1932, 1940, and 1942 (IA); same station, Thorne 13061, 1953 (IA).

This hybrid has also been reported from Newfoundland and Quebec, by Fernald (1950).

J. nodosus L. Map 6-G
Frequent across the state, except evidently absent from most of the southeastern quarter; sandy marshes, sloughs, prairie swales, bogs, and fens.

J. torreyi Cov. Map 6-H
Common throughout; prairie swales, marshes, and wet margins of ponds, lakes, and sloughs.

CYPERACEAE

Carex alopecoidea Tuckerm. Map 7-A
Infrequent, primarily in northwestern Iowa, but locally eastward to Allamakee, Johnson, and Muscatine counties; alluvial woods, marshes, and sedge meadows.

C. annectans (Bickn.) Bickn. var. *xanthocarpa* (Bickn.) Wieg. (*C. brachyglossa* Mack,) Map 7-B
Frequent across Iowa; prairie swales, lake and pond margins, low pastures and fields.

C. aquatilis Wahl. var. *altior* (Rydb.) Fern. Map 7-C
Rare, northwestern Iowa, locally southward to Jefferson and Poweshiek counties; margins and shallow water of ponds, lakes, marshes, and sloughs, fens, bogs, and prairie swales.

C. atherodes Spreng. (*C. laeviconica* Dewey) Map 7-D
Frequent across Iowa; margins and shallow water of ponds, lakes, marshes, and sloughs, prairie swales, bogs, and streambanks.

Gleason and Cronquist (1963) recognize *C. laeviconica* as specifically distinct from *C. atherodes*. Gilly (1946), however, has reduced the former to varietal status as *C. atherodes* var. *longolanceolata* (Dewey) Gilly. Both var. *atherodes* and var. *longolanceolata* are present in Iowa.

C. bebbii Olney Map 7-E
Frequent in the northeastern half of Iowa; marshes, sloughs, swales, and sedge meadows.

C. buxbaumii Wahl. Map 7-F
Infrequent, primarily in the eastern half of the state; marshes, sloughs, swales, and sedge meadows.

C. chordorrhiza L. f. Map 7-G
EMMET: bog 2 miles north of Armstrong, Cratty, 1878 (IA) and 1884 (ISC). HANCOCK: *Sphagnum* mat in Dead Man's Lake, Pilot Knob State Park, Thorne 14372, 1954 (IA).

C. comosa Boott. Map 7-H
Infrequent, primarily in north-central Iowa, but locally eastward to Linn and Muscatine counties; margins and shallow water of ponds, lakes, sloughs, and marshes, and in prairie swales and sedge meadows.

C. cristatella Britt. Map 8-A
Common in the eastern half of Iowa, infrequent westward; prairie swales, sedge meadows, marshes, pond and lake margins.

C. crus-corvi Shuttlw. Map 8-B
Rare to infrequent in alluvial woods of southern Iowa, locally northward to Dickinson county.

C. diandra Schrank. Map 8-C
Rare, sedge meadows and prairie swales of north-central Iowa.

C. emoryi Dewey Map 8-D
Infrequent across the state; sedge meadows, prairie swales, pond and lake margins, sloughs, and marshes.

C. grayii Carey (*C. asa-grayii* Bailey) Map 8-E
Frequent in alluvial woods of the southeastern third of Iowa.

C. haydenii Dewey Map 8-F
Infrequent, primarily in the Lakes Region and eastern third of Iowa, locally westward; marshes, sedge meadows, sloughs, and prairie swales.

C. hystericina Muhl. Map 8-G
Frequent to common throughout; prairie swales, marshes, bogs, fens, and wet margins of ponds, lakes, and sloughs,

C. interior Bailey Map 8-H
Infrequent, eastern Iowa and the Lakes Region; prairie swales, sedge meadows, sloughs, marshes, bogs, and fens.

C. lacustris Willd. Map 9-A
Infrequent, scattered locally in southeastern, central and northwestern Iowa; marshes, bogs, fens, margins and shallow water of ponds, lakes, and sloughs.

C. lasiocarpa Ehrh. (*C. languinosa* Michx.) Map 9-B
Common throughout; prairie swales,marshes, bogs, and wet margins of ponds, lakes, and sloughs.

Two varieties are recognized by Gilly (1946) and Gleason and Cronquist (1963): var. *americana* Fern. and var. *latifolia* (Bockl.) Gilly; the latter is synonomous with *C. languinosa*. Both varieties occur in Iowa

C. limosa L. Map 9-C

EMMET: bog, Cratty, 1878, 1879, and 1884 (ISC), and 1892 (IA). HANCOCK: *Sphagnum* mat in Dead Man's Lake, Pilot Knob State Park, Thorne 15940 and 16269, 1955 (IA).

C. lupulina Muhl. Map 9-D
Common statewide, except evidently absent from the northwestern third; marshes, sloughs, alluvial woods.

C. muricata L. var. *cephalantha* Bailey (*C. cephalantha* (Bailey) Bickn.; *C. stellulata* Gooden.) Map 9-E
HANCOCK: floating *Sphagnum* mat in Dead Man's Lake, Pilot Knob State Park, Ellington twp., Thorne 14366, 1954 (IA); same station, Grant 12302, 1954 (ISTC); same station, Gunn 2509, 1962 (ISC).

C. prarisa Dewey (*C. prairea* Dewey of later editions) Map 9-F
Rare, primarily in north-central Iowa, locally southward to Johnson, Poweshiek, and Story counties; sedge meadows, prairie swales, bogs, and fens.

C. praegracilis Boott. (*C. camporum* Mack.) Map 9-G
Infrequent to rare, northern and central Iowa, also reported from Scott county; prairie swales and sedge meadows, occasionally on drier soil.

C. retrorsa Schw. Map 9-H
Infrequent across northern Iowa in alluvial forests.

C. rostrata Stokes var. *utriculata* (Boott) Bailey Map 10-A
Rare, scattered locally across northern Iowa; margins and shallow water of ponds, lakes, marshes, and sloughs.

C. sartwellii Dewey Map 10-B
Infrequent, scattered locally in the northern half of Iowa; margins and shallow water of ponds, lakes, marshes, and sloughs, bogs, fens, prairie swales, and sedge meadows.

C. scoparia Schkuhr. Map 10-C
Frequent in the eastern half of Iowa in prairie swales and marshes, occasionally onto drier soil.

C. shortiana Dewey Map 10-D
Frequent, southeastern Iowa; marshes, prairie swales, alluvial forests.

C. squarrosa L. Map 10-E
APPANOOSE: swamp, Fitzpatrick, 1896 (ISC). DAVIS: wet soil near Soap Creek, s.9 Lick Creek twp., Hayden 9205, 1939 (ISC). DES MOINES: sandy alluvial woods at Patterson Lake, Spring Grove region, s.36 Union twp., Lammers 1210, 1977 (ISC). HENRY: swamp, Savage, 1899 (IA). JEFFERSON: slough along Cedar Creek, s.19 Cedar twp., MacDonald 2064, 1934 (ISC); pond margin in Fulton's Bottoms, s.33 Center twp., Gilly 1857, 1934 (ISC). LEE: wet soil, Fults, 1931 (ISC). VAN BUREN: Lacey-Keosauqua State Park, Fults, 1933 (ISC); slough along Ia. Hwy. 2, 5 miles northeast of Cantril, Davidson 4224, 1954 (IA).

C. stipata Muhl. (*C. laevivaginata* (Kuk.) Mackenzie) Map 10-F
Frequent statewide; bogs, fens, marshes, sloughs, swales, sedge meadows, and alluvial forest.

Gilly (1946) recognized two varieties in Iowa; var. *stipata* and var. *laevivaginata* Kuk. The latter is considered specifically distinct by Gleason and Cronquist (1963).

C. stricta Lam. (*C. strictior* Dewey) Map 10-G
Frequent statewide; margins and shallow water of ponds, lakes, marshes, and sloughs, bogs, fens, and sedge meadows.

C. suberecta (Olney) Britt. Map 10-H
Infrequent, in the northeastern third and Fremont county; pond and lake margins, sedge meadows, and prairie swales.

C. synchocephala Carey Map 11-A
Rare to infrequent in the Lakes Region and Monona county; wet margins of ponds, lakes, marshes, and sloughs, prairie swales, and sedge meadows.

C. tetanica Schkuhr Map 11-B
Rare to infrequent in northern Iowa, most frequent in the Lakes Region; prairie swales, marshes, sedge meadows, and wet pond and lake margins.

C. tribuloides Wahl. Map 11-C
Frequent in the southeastern half of the state, also known from the Lakes Region; prairie swales, sedge meadows, and marshes.

C. trichocarpa Muhl. Map 11-D
Infrequent, scattered locally along the Mississippi River, in southern Iowa, and in the Lakes Region; marshes, swales, and sedge meadows.

C. tuckermani Boott Map 11-E
JASPER: alluvial woods, North Skunk River bottoms in Richland twp., Norris, 1886 (Grinnell College) and 1897 (ISC).

C. typhina Michx. (*C. typhinoides* Schw.) Map 11-F
Infrequent in the eastern third of Iowa; alluvial woods and marshes.

C. vesicaria L. (*C. monile* Tuckerm.) Map 11-G
Rare to infrequent, scattered locally across Iowa, but most frequent in east-central Iowa; wet margins of ponds, lakes, marshes, and sloughs, prairie swales, and sedge meadows.

C. vulpinoidea Michx. Map 11-H
Common across Iowa; marshes, prairie swales, and wet margins.

Cyperus acuminatus Torr. & Hook. Map 12-A
Infrequent, southeastern Iowa and along the Missouri River; sandy marshes and alluvial openings, and wet sandy pond and lake margins.

C. aristatus Rottb. (*C. inflexus* Muhl.) Map 12-B
Frequent across the state; sandy or muddy margins and streambanks.

C. diandrus Torr. Map 12-C
Rare, primarily in the Lakes Region and east-central Iowa; sandy marshes and prairie swales.

C. engelmanni Steud. Map 12-D
Rare to infrequent, primarily in north-central Iowa; prairie swales, and sandy or muddy margins of ponds, lakes, and sloughs.

C. erythrorhizos Muhl. Map 12-E
Frequent statewide; wet margins of ponds, lakes, marshes, and sloughs.

C. esculentus L. Map 12-F
Very common in Iowa, in a variety of wet sandy or muddy habitats; often a weed in bottomland fields and pastures.

C. odoratus L. var. *squarrosus* (Britt.) Gilly (*C. ferrunginescens Bockl.; C. speciosus* of auth., not Vahl.; *C. ferax* of auth., not Rich.; *C. michauxianus* of auth., not Schultes) Map 12-G
Frequent across the state; wet sandy pond and lake margins, prairie swales, and marshes.

C. rivularis Kunth. Map 12-H
Frequent throughout; wet margins of ponds, lakes, marshes, and sloughs.

C. strigosus L. Map 13-A
Very common in nearly any wetland habitat, often onto drier soil; occasionally a crop and pasture weed.

Dulichium arundinaceum (L.) Britt. Map 13-B
Rare, primarily along the Skunk and Cedar-Iowa river systems in east-central and north-central Iowa; sandy marshes, peat bogs, alluvial woods, and on the *Sphagnum* mat in Hancock county.

Eleocharis acicularis (L.) R. & S. Map 13-C
Frequent statewide; prairie swales, sandy pond and lake margins and streambanks.

E. atropurpurea (Retz.) Kunth. Map 13-D
JEFFERSON: margin of Fairfield city reservoir, Center twp., McDonald 1206, 1933 (PC). LOUISA: low sandy area near slough, Big Sand Mound, s.4 Port Louisa twp., Davidson 3318, 1954 (IA). MUSCATINE: wet sand near Fruitland, Reppert, 1895 (New York Botanical Garden herbarium).

E. calva Torr. Map 13-E

Frequent throughout; wet margins of ponds, lakes, sloughs, and streams, prairie swales, and meadows.

E. compressa Sulliv. (*E. acuminata* (Muhl.) Nees.) Map 13-F
Infrequent, scattered across the state; prairie swales and wet margins of ponds and lakes.

E. coloradoensis (Britt.) Gilly (*E. pravula* (R. & S.) Link. var. *anachaete* (Torr.) Sv. Map 13-G
CLAY: sandy south beach of Round Lake, Hayden 690, 1936 (ISC). PALO ALTO: sandy beach of Medium Lake, Hayden 8291, 1940 (ISC).

E. flavenscens (Poir.) Urban var. *olivacea* (Torr.) Gl. (E. olivacea Torr.) Map13-H
JOHNSON: muddy margin of Swan Lake, s.5 Madison twp., Thorne 10466, 1950 (IA).

E. macrostachya Britt. (*E. smallii* Britt.; *E. palustris* of auth., not L.) Map 14-A
Frequent throughout; wet margins and shallow water of ponds, lakes, and marshes.

E. obtusa (Willd.) Schultes (*E. engelmannii* Steud.) Map 14-B
Common throughout; wet margins of ponds, lakes, sloughs, and marshes

Gilly (1946) states that two varieties are present in Iowa: var. *obtusa* and var. *engelmannii* (Steud.) Gilly. Gleason and Cronquist (1963) consider both these taxa to be synonymous with *E. ovata* (Roth.) R. & S.

E. ovata (Roth.) R. & S. Map 14-C
HANCOCK: *Sphagnum* mat in Dead Man's Lake, Pilot Knob State Park, Thorne 14355, 1954, and 15958, 1955 (IA).

E. pauciflora (Lightf.) Link. var. *fernaldii* Sv. Map 14-D
DICKINSON: Silver Lake fen, Thorne 12965, 1953 (IA). EMMET: bog northwest of Estherville, Wolden, 1931 (ISC); fen along the Des Moines River, s.21 Emmet twp., Grant 8800, 1948 (ISC,ISTC).

E. tenuis (Willd.) Schultes Map 14-E
Infrequent, scattered locally in the northeastern half of Iowa; bogs, marshes, sloughs, and prairie swales.

E. wolfii Gray Map 14-F
CEDAR: sandy bog along the Cedar River, s.36 Rochester twp., Fay 616, 1950 (IA). EMMET: Armstrong, Cratty, 1885 (ISC) and 1886 (IA, ISC). JOHNSON: wet sandy seepage slopes, s.35 Cedar twp., Thorne 15820 and 15850, 1955 (IA). UNION: wet swales in lowland prairie, s.28 Douglas twp., Fay 3214, 1952 (IA)

Eriophorum angustifolium Honck. Map 14-G
Infrequent, northeastern third of Iowa; wet margins of ponds, lakes, marshes and sloughs, sedge meadows, bogs and fens.

E. gracile Koch Map 14-H
CERRO GORDO: Buffalo Slough, Shimek, 1917 (IA). EMMET: bog, Armstrong, Cratty, 1878 and 1883 (ISC). HANCOCK: *Sphagnum* mat in Dead Man's Lake, Pilot Knob State Park, Thorne 14371, 1954 (IA). WEBSTER: Crawford's Mill, Oleson, 1905 (ISC).

Fimbristylis autumnalis (L.) R. & S. Map 15-A
DELEWARE: moist sandy shore, Silver Lake Park, s. 21 Delhi twp., Rickey 2416, 1963 (IA). DES MOINES: low sandy pond margin, Spring Grove region, Davidson 1652, 1954 (IA); same station, Lammers 1166 and 1202, 1977 (ISU). JOHNSON: sandy margin of Swan Lake, s.5 Madison twp., Thorne 13705, 1953 (IA). JONES: sandy marsh, s.6 Hale twp., Cooperrider 3698, 1956 (IA). LOUISA: sandy lake margin, Big Sand Mound, s.4 Port Louisa twp., Guldner (DPM). MUSCATINE: sandy pond margin, s.7 Lake twp., Thorne 10970, 1952 (IA). SCOTT: wet sandy pond margin, Credit Island, Guldner, 1948 (DPM).

Hemicarpha micrantha (Vahl.)Britt. Map 15-B
BLACK HAWK: Waterloo, Newton, 1893 (ISTC). CEDAR: sandy pond margin along the Cedar River, Rochester twp., Fay, 1950 (IA). DELEWARE: moist sandy shore, Silver Lake Park, s.21 Delhi twp., Rickey 2420, 1963 (IA). DES MOINES: wet sandy marsh, Spring Grove region, s.36 Union twp., Lammers 1165, 1977 (ISC). GREENE: wet sandy margin of Spring Lake, Monson 622, 1955 (ISC). JOHNSON: wet sand bar in Iowa River, Iowa City, Shimek, 1902 (ISC); wet sandy margin of Swan Lake, s.5 Madison twp., Thorne 13705, 1953 (IA). LOUISA: wet sandy margin of Lake Odessa, s.20 Port Louisa twp., Davidson 4018, 1955 (IA); sandy shore of lake, Big Sand Mound, s.4 Port Louisa twp., Guldner (DPM). MUSCATINE: Cedar River, Reppert, 1895 (IA). SCOTT: sandy shore of Credit Island, Guldner (DPM). STORY: Story City, Pammel, 1891 (ISC); along Skunk River south of Story City, Fults, 1934 (ISC); mudflats on Squaw Creek near 6th St. bridge, Ames, Pohl, 1951 (ISC). WEBSTER: Ft. Dodge, Oleson, 1906 (ISC); Des Moines River, Ft. Dodge, Paige (ISC).

Rhynchospora capillacea Torr. Map 15-C
CLAY: fen along the Little Sioux River northwest of Ruthven, Hayden 7020, 1937 (ISC). DICKINSON: Silver Lake fen, Thorne 13054, 1953 (IA). EMMET: fen along the Des Moines River, s.21 Emmet twp., Thorne 13098, 1953 (IA). PALO ALTO: fen east of Ruthven, Weber and Hayden 1144, 1938 (ISC).

Scirpus americanus Pers. (*S. pungens* Vahl.) Map 15-D
Rare to infrequent; commonest in the Lakes Region and along the Missouri River, scattered locally in southeastern and central Iowa; bogs, fens, marshes, and prairie swales.

S. atrovirens Willd. (*S. pallidus* (Britt.) Fern.; *S. georgianus* Harper) Map 15-E
Very common throughout Iowa; prairie swales, and wet margins of ponds, lakes, marshes, and sloughs.

Gilly (1946) and Gleason and Cronquist (1963) recognize two varieties, both present in Iowa: var. *atrovirens* and var. *pallidus* Britt.

S. cyperinus (L.) Kunth. (*S. pedicellatus* Fern.; *S. rubicosus* Fern.; *S. atrocinctus* Fern.; *S. eriophorum* Michx.) Map 15-F
Frequent in the eastern half of the state, scattered locally westward, and evidently absent from the northwestern third; sedge meadows, bogs, prairie swales, marshes, and sloughs.

Fernald (1950) recognizes a number of segregate species from this species. Gilly (1946), however, treats these segregates as varieties. The following are present in Iowa: var. *cyperinus;* var. *laxus* (Gray) Wats. & Coult. (*S. pedicellatus*); var. *rubricosus* (Fern.) Gilly; var. *brachypodus* (Fern.) Gilly (*S. atrocinctus*).

S. fluviatilis (Torr.) A. Gray Map 15-G
Frequent, scattered throughout Iowa; wet margins and shallow water of ponds, lakes, marshes, and sloughs.

S. hallii Gray (*S. supinus* of auth., not L.) Map 15-H
LOUISA: wet sandy margin of lake, Big Sand Mound, s.4 Port Louisa twp., Guldner, 1960 (DPM). MUSCATINE: wet sand, Fruitland, Reppert, 1890 (DPM).

S. heterochaetus Chase Map 16-A
Rare to infrequent, scattered locally across Iowa; wet margins and shallow water of ponds, lakes, marshes, and sloughs.

S. lineatus Michx. Map 16-B
Frequent, primarily in the southeastern third of the state; wet margins of ponds. lakes, marshes, and sloughs, prairie swales, sedge meadows, and bogs.

S. paludosus A. Nels. Map 16-C
DICKINSON: marsh, Silver Lake, Grant 8945, 1948 (IA).
PALO ALTO: Rush Lake, s.21 Booth twp., Hayden 3163, 1933 (ISC).

Gleason and Cronquist (1963) treat this taxon as *S. maritimus* L. var. *paludosus* (A. Nels.) Gl.

S. smithii Gray Map 16-D

CERRO GORDO: swamp at Clear Lake, Shimek, 1912 (IA).

S. torreyi Olney Map 16-E
CLINTON: Butler, 1878 (Gray Herbarium).

S. validus Vahl. (*S. acutus* Muhl.; *S. occidentalis* (Wats.) Chase; *S. lacustris* of auth., not L.) Map 16-F
Very common throughout Iowa; wet margins and shallow water of ponds, lakes, marshes, and sloughs, prairie swales, and bogs.

Although *S. acutus* is considered a distinct species by Gilly (1946) and Gleason and Cronquist (1963), we have followed Beal and Monson (1954) and Davidson (1959) in reducing *S. acutus* to synonymy under *S. validus*.

Scleria triglomerata Michx. Map 16-G
Infrequent in the eastern half of the state, also in Dickinson county; wet sandy prairie swales.

S. verticillata Muhl. Map 16-H
EMMET: Emmet twp., Wolden, 1929 and 1931 (ISC); Hayden, 1934 (ISC); Estherville, Fults, 1934 (ISC). A species of fens and bogs.

POACEAE

Alopecurus aequalis Sobol Map 17-A
Infrequent in northeastern half of Iowa, locally southwestward; wet margins and shallow water of ponds, lakes, and marshes.

A. carolinianus Walt. Map 17-B
Frequent in the southeastern third of Iowa, also at Gitchie Manitou State Preserve, Lyon county; marshes, prairie swales, pond and lake margins.

Beckmannia syzigachne (Steud.) Fern. Map 17-C
Infrequent in northwestern Iowa; wet margins and shallow water of ponds, lakes, and sloughs

Calamogrostis canadensis (Michx.) Beauv. Map 17-D
Frequent across Iowa; marshes, prairie swales, and bogs.

C. inexpansa A. Gray Map 17-E
Infrequent, northwestern Iowa; marshes, prairie swales, bogs, and fens.

Echinochloa walteri (Pursh) Nash Map 17-F
DES MOINES: marsh, Ray Lake, northeast of Kingston, Davidson 1691, 1954 (IA); marsh, Dumbbell Lake, a cut-off slough along the Mississippi River north of Burlington, s.15 Tama twp., Lammers 1099, 1977 (ISC). JONES: s.18 Oxford twp., Brown 271, 1948 (IA). LINN: wet soil, Cedar Rapids, Shimek, 1892 (IA). LOUISA: marsh west of Conesville, s.14 Oakland twp., Davidson 3526, 1955 (IA). MARSHALL: Marshalltown, Pammel (ISC).

Eragrostis frankii C. A. Meyer Map 17-G
Frequent statewide; marshes, swales, and streambanks.

Pohl (1966) recognizes two varieties in Iowa: var. *frankii* and var. *brevipes* Fassett.

E. hypnoides (Lam.) B.S.P. Map 17-H
Frequent statewide; marshes, swales, and streambanks.

E. reptans (Michx.) Nees
HARDIN: Iowa Falls, Peck (ISC). A species of streambanks.

Glyceria borealis (Nash) Batch. Map 18-B
Locally abundant in the Lakes Region, also reported from Linn county; shallow water and margins of ponds, lakes, and marshes.

G. grandis S. Wats. Map 18-C
Frequent in the northern half of Iowa; wet margins and shallow water of ponds, lakes, marshes, and sloughs.

G. septentrionalis Hitchc. Map 18-D
Infrequent in marshes and ponds of southeastern and central Iowa.

G. striata (Lam.) Hitchc. Map 18-E
Frequent statewide; alluvial woods, marshes, and streambanks.

Hierchloe odorata (L.) Beauv. Map 18-F
Frequent across northern Iowa; sedge meadows, fens, hanging bogs, marshes, and prairie swales.

Leersia lenticularis Michx. Map 18-G
Rare to infrequent in alluvial woods along the Mississippi River.

L. oryzoides (L.) Sw. Map 18-H
Frequent statewide; wet margins of ponds, lakes, and marshes.

L. virginica Willd. Map 19-A
Frequent statewide; alluvial woods, marshes, wet margins.

Leptochloa fascicularis (Lam.) Gray Map 19-B
Rare, scattered locally in the western half of Iowa; alluvial woods, wet margins of ponds and lakes.

Muhlenbergia asperifolia (Nees. & Mey.) Parodi Map 19-C
Native to the bogs and fens of the Lakes Region, but introduced in wet soil along the Chicago and Northwestern railroad tracks in Boone and Story counties.

M. glomerata (Willd.) Trin. Map 19-D
Infrequent in fens, bogs, and marshes of northern Iowa, locally southward to Jones and Muscatine counties.

M. mexicana (L.) Trin. Map 19-E
Frequent, primarily in the northeastern half of Iowa; bogs marshes, alluvial woods, prairie swales, and wet margins of ponds and lakes.

Phalaris arundinacea L. Map 19-F
Frequent statewide; marshes, streambanks, low pastures.

Phragmites communis Trin. Map 19-G
Frequent across Iowa, commonest in the north-central portion of the state; prairie swales, marshes, bogs, and wet margins.

Poa palustris L. *Map 19-H*
Frequent, primarily in the northeastern half of Iowa; wet margins of ponds, lakes, marshes, and sloughs, alluvial woods, and prairie swales.

Scolochloa festucacea (Willd.) Link. Map 20-A
Restricted to sedge meadows and fens of the Lakes Region, and in Webster county.

Spartina pectinata Link. Map 20-B
Very common in low prairie and marshes throughout the state.

Tripsacum dactyloides L. Map 20-C
APPANOOSE: slough, Fitzpatrick, 1896 (ISC). DECATUR: slough, wet places, Fitzpatrick, 1897 and 1898 (ISC); sloughs at Van Wert, Hitchcock, 1888 (ISC). ADAIR: wet roadside, 8 miles west of Macksburg, Isely & Brown 165, 1947 (ISC). LEE: Donnellson, Mier, 1922 (ISC). LUCAS: wet meadow and pond, Stephens Forest, Van Bruggen 2750, 1957 (IA). MADISON: low ground near Winterset, Churchill, 1922 (ISC). MONROE: wet drainage ditch 2 miles west of Albia on Hwy. 34, s.20 Tray twp., Hayden 9238, 1937 (ISC). MUSCATINE: wet slough near Wyoming Hill, Reppert, 1895 (ISC, DPM). RINGGOLD: Hayden, 1926 (ISC).

Zizania aquatica L. Map 20-D
Infrequent, scattered locally in the northeastern half of Iowa; wet margins and shallow water of ponds, lakes, marshes, and sloughs.

Pohl (1966) and Gleason and Cronquist (1963) recognize three varieties, all of which are present in Iowa: var. *aquatica*, var. *angustifolia* Hitchc., and var. *interior* Fassett; the latter is the commonest variety in the state.

SPARGANIACEAE

Sparganium americanum Nutt. (*S. androcladum* (Englm.) Morong.) Map 20-E
Rare to infrequent, primarily in eastern Iowa, locally scattered in central Iowa and the Lakes Region; wet margins and shallow water of ponds, lakes, sloughs, and marshes.

Although Gleason and Cronquist (1963) consider these two taxa to be distinct species, Beal and Monson (1954) have shown that they are not clearly separable in Iowa.

S. chlorocarpum Rydb. (*S. acaule* Rydb.) Map 20-F
Rare to infrequent, scattered across northern and central Iowa, commonest in the Lakes Region; wet margins and shallow water of ponds, sloughs, lakes, marshes, and bogs.

S. eurycarpum Englm. Map 20-G
Common throughout Iowa; wet margins and shallow water of ponds, lakes, sloughs, marshes, and bogs.

TYPHACEAE

Typha angustifolia L. Map 20-H
Infrequent, scattered locally across the state, commonest in the Lakes Region; wet margins and shallow water of ponds, lakes, bogs, sloughs, and marshes, especially in alkaline water.

T. x *glauca* Godr. (*T. angustifolia* L. x *latifolia* L.; *T. angustifolia* var. *elongata* (Dudley) Wieg.)
This hybrid taxon occurs wherever the two parent species grow together. It is variable in morphology and has not always been recognized by Iowa botanists although it is very common.

T. latifolia L. Map 21-A
Very common throughout Iowa; wet margins and shallow water of ponds, lakes, slough, and marshes, prairie swales, bogs, fens, and wet roadside ditches. The dominant species in many marsh communities.

ARACEAE

Acorus calamus L. Map 21-B
Frequent in the northeastern half of Iowa; wet margins and shallow water of marshes, sloughs, and bogs, and in wet prairie swales.

Calla palustris L. Map 21-C
LINN: swamp on Abbey Creek near Bertram, Berry, 1912 (IA).

Orontium aquaticum L. Map 21-D
LINN: prairie pond among cattail flags 3 miles from Troy Mills, Berry, 1912 (IA).

This species of the Atlantic Coastal Plain has not been reported from any other station in the Mississippi River valley north of Kentucky (Gleason and Cronquist, 1963). Its purported occurrence in eastern Iowa is extremely unusual and may, in fact, be an error. Localities given by Berry are often unreliable (Eilers, personal communication).

Peltandra virginica (L.) Kunth. Map 21-E
DES MOINES: abundant throughout boggy marsh along Iowa Slough, just north of Pumping Station #4, along the Mississippi River, 4 miles northeast of Huron, NE ¼ s.4 T72N R1W Huron twp., Lammers 1220, 1977 (ISC). GREENE: single plant on muddy margin of Spring Lake, s.25 Hardin twp., Freckmann 788, 1963 (ISC); a single plant of this species was observed by us at this station in September 1975, but it was no longer present at this site in September 1977.

This is the first published report of this southern species in Iowa. The population in Des Moines county seems indigenous, because it is quite large and located in an undisturbed area. The single plant in Greene county most likely represents a recent introduction, because it occurs in a heavily used state park. The nearest reported stations are in Peoria county, Illinois (Jones and Fuller 1955), and in St. Charles county, Missouri (Steyermark 1963).

Symplocarpus foetidus (L.) Nutt. Map 21-F
Rare in hanging bogs and wet ravine bottoms of northeastern and east-central Iowa.

LEMNACEAE

Lemna minor L. Map 21-G
Very common throughout the state; floating on quiet water of lakes, ponds, marshes, and sloughs.

Davidson (1959) states that reports of *L. minima* Phil. and *L. perpusilla* Torr. from Jefferson county (Gilly and MacDonald, 1947) were based on misidentified specimens of *L. minor*.

L trisulca L. Map 21-H
Frequent in northern and eastern Iowa, scattered locally southwest; floating on quiet water of lakes, ponds, marshes, and sloughs.

Spirodela polyrhiza (L.) Schleid. Map 22-A
Frequent across Iowa; floating on quiet water of lakes, ponds, marshes, and sloughs.

Wolffia columbiana Karst. Map 22-B
Rare, scattered locally across the state, most frequent in the east; floating on quiet water of lakes, ponds, marshes, and sloughs.

W. punctata Griseb. Map 22-C
Rare to infrequent, primarily in southeastern and east-central Iowa, and the Lakes Region; quiet water of ponds, lakes, sloughs, and marshes.

PONTEDERIACEAE

Heteranthera limosa (Sw.) Willd. Map 22-D
FREMONT: Hamburg, Hitchcock (IA). LYON: shallow pool on Sioux quartzite, Gitchie Manitou State Park, Thorn and Grant 14246, 1954 (IA). MUSCATINE: ponds along the Cedar River, Reppert, 1894 (IA).

H. reniformis R. & P. Map 22-E
JEFFERSON: Fairfield city reservoir, Center twp., McDonald and Dole, 1931 (PC). LUCAS: Red Haw Hill Reservoir, Lewis, 1948 (ISC).

Pontederia cordata L. Map 22-F
Infrequent, primarily in the southeastern and east-central sections of Iowa, scattered locally westward; wet margins and shallow water of ponds, lakes, marshes, and bogs.

Zosterella dubia (Jacq.) Small (*Heteranthera dubia* (Jacq.) MacM.) Map 22-G
Infrequent, scattered across Iowa, but most frequent in northern and east-central portions of the state; shallow water and wet margins of ponds and lakes.

LILIACEAE

Lilium canadense L. ssp. *michiganese* (Farw.) Boivin & Cody (*L. michiganese* Farw.; *L canadense* of auth., not L.; *L superbum* of auth., not L.) Map 22-H
Frequent across Iowa; alluvial woods, prairie swales, and sedge meadows.

Gleason and Cronquist (1963) consider this taxon to be a form of *L. superbum*. Boivin and Cody (1956) have described *L. superbum* and *L. michiganese* as subspecies of *L. canadense*. We follow Boivin and Cody (1956) in this treatment.

IRIDACEAE

Iris virginica L. var. *shrevei* (Small) E. Anderson (*I. versicolor* of auth., not L.; *I. shrevei* Small) Map 23-A
Common throughout the state; bogs, fens, prairie swales, wet margins and shallow water of ponds, lakes, marshes, and sloughs.

Gleason and Cronquist (1963) regard this taxon as specifically distinct from *I. virginica*, as *I. shrevei*. We, however, follow Anderson (1928), Beal and Monson (1954), and other authors, in

using the epithet.

ORCHIDACEAE

Calopogon pulchellus (Salisbury) R. Br. (*C. tuberosus* (L.) B.S.P.) Map 23-B
Rare, northeastern and east-central Iowa, locally southward to Appanoose county; bogs, fens, sedge meadows, prairie swales.

Cypripedium x *andrewsii* Fuller (*C. calceolus* L. x *candidum* Muhl.) Map 23-C
DECATUR: seeping hillside fens, s.28 Burrell twp., Niemann 913, 1974 (ISC). Niemann (1975) reports that *C. candidum* occurred with the hybrid in the fen, while *C. canceolus* occurred in the adjacent woods.

C. candidum Muhl. Map 23-D
Rare to infrequent, scattered locally across Iowa, primarily in the northeastern third; bogs, fens, and prairie swales.

C. reginae Walt. Map 23-E
Rare, scattered locally, primarily in eastern and central Iowa, in bogs, fens, and prairie swales.

Habenaria clavellata (Michx.) Spreng. Map 23-F
FAYETTE: damp border of woods, Wadena, Fink, 1893 (ISC). MUSCATINE: banks of the Cedar River, Lake twp., Mackenzie, 1893 (IA).

H. flava (L.) R. Br. var *herbiola* (Lindl.) Correll Map 23-G
Rare, scattered locally in prairie swales and bogs of eastern Iowa.

H. hyperborea (L.) R. Br. var. *huronensis* (Nutt.) Farw. Map 23-H
Rare in fens and bogs of northern Iowa.

H. leucophaea (Nutt.) Gray Map 24-A
Frequent throughout the state in bogs, sedge meadows, and prairie swales.

H. psychodes (L.) Spreng. Map 24-B
Rare in wet woods and meadows of extreme northeastern Iowa.

Liparis loeselii (L.) Rich. Map 24-C
Rare in bogs, fens, and prairie swales; northern and east-central Iowa.

Pogonia ophioglossoidea (L.) Ker-Gawl. Map 24-D
LINN: low boggy swamps near river, Berry, 1913 (IA).

Spiranthes cernua (L.) Rich. Map 24-E
Infrequent, primarily in the northeastern third; prairie swales, meadows, fens, and bogs.

S. romanzoffiana Cham. Map 24-F
DICKINSON: Silver Lake fen, Grant 11180, 1949 (IA). EMMET: bog near Estherville, Wolden, 1925 (ISC).

ADDENDUM TO PART I

(A) The following county records were inadvertently omitted from Part I of this paper:

Armoracia aquatica (Eat.) Wieg.
This rare aquatic species was reported in Part I from only Scott and Muscatine counties. The following additional specimen has been located. UNION: Creston, T. L. Andrews, 1880 (ISC).

Bidens aristosa (Michx.) Britt.
In Part I, this marsh species was reported only from Jefferson, Keokuk, Muscatine, and Scott counties in southeastern Iowa. The following specimen represents a new county record. DES MOINES: wet sandy marsh near sandpit, Spring Grove region, s.36 Union twp., Lammers & Seebach 1285, 1977 (ISC).

Cardamine douglasii (Torr.) Britt.
This species of seepage slopes and alluvial woods was shown to occur (Map 16-C) in only four counties in southern and eastern Iowa: Decatur, Linn, Muscatine, and Scott. Additional specimens from the following counties in southeastern Iowa are deposited at IA and ISC: Des Moines, Iowa, Jefferson, Johnson, Louisa, Monroe, Poweshiek, Tama, and Washington.

Decodon verticillatus (L.) Ell.
This species was reported from only Linn county in Part I. ALLAMAKEE: sandy pond margin, s.1 French Creek twp., Hartley and Thorne 6195, 1958 (IA).

Justicia americana (L.) Vahl.
This species was reported in Part I from only Henry, Jefferson, and Lee counties in southeastern Iowa. The following new county record has recently been collected. DES MOINES: marshy margin and shallow water at south shore of lake, Geode State Park, s.1 T69N R5W, Lammers 1110, 1977 (ISC).

Lobelia kalmii L.
In addition to the stations in the Lakes Region, the following specimen is known. CLAYTON: sandy shore of a Mississippi River island near Marquette, Shimek, 1921 (IA).

Mimulus x *minthoides* Greene (*M. alatus* Ait. x *ringens* L.; *M. ringens* L. var. *minthoides* (Greene) Grant)
This taxon, considered in Part I as a variant of typical *M. ringens*, is here recognized as a hybrid between *M. alatus* and *M. ringens*. The former is rare, restricted to shaded streambanks and alluvial woods in southeastern Iowa; the latter is common statewide in open marshes and swales. The hybrid is intermediate in characters of leaf outline, stem winging, pedicel length, and corolla color. This hybrid has recently been discussed by Windler et al. (1976). The only Iowa specimen is the following. DES MOINES: marshy openings in alluvial woods along Flint Creek, on the floodplain of the Mississippi River, just north of Burlington on Iowa Hwy. 99, s.20 Tama twp., occurring with both parents, Lammers 486, 1975 (ISC).

Plantago cordata Lam.
This species of marshes and shallow water was not included in Part I. It is known in Iowa only by a very old specimen. SCOTT: Davenport, C. C. Parry, 1847 (Parry Herbarium at ISC). This specimen is mentioned by Guldner (1960).

(B) Several species were misidentified in Part I. These are listed below, with the correct name in parentheses.
Jussaeia repens L. var *glabrescens* Ktze. (= *Ludwigia peploides* (HBK) Raven ssp. *glabrescens* (Ktze.) Raven)
Ophioglossum vulgatum L. (= *O. pseudopodum* (Blake) Farw.)
Parnassia parviflora DC (= *P. palustris* L. var. *neogaea* Fern.)
Selaginella apoda (L.) Spring. (= *S. eclipes* Buck).

DISTRIBUTIONAL PATTERNS OF AQUATIC AND WETLAND VASCULAR PLANTS IN IOWA

A discussion of environmental and historical factors responsible for the geographic distribution of plant species is beyond the scope of this work. However, we have included a summary of the various distributional patterns of Iowa aquatic and wetland species and we hope that these data will stimulate further work on this topic. Some species are extremely rare, occurring in only one or two locales, or at several widely separated stations within Iowa. Other species of wider distribution may occur quite frequently in certain sectors of the state, but be entirely absent outside this area. A large group of ubiquitous species may be found at almost any site where environmental factors allow their establishment and growth.

Iowa is situated at the transition zone of several floristic provinces,

the two most prominent being the Tall-Grass Prairie Province and the Eastern Deciduous Forest Province. Additionally, elements associated with Northern Coniferous Forests enter northern Iowa, and elements of the Atlantic Coastal Plain Province enter southeastern Iowa along the Mississippi River. The lists that follow are intended to show species whose distributions best demonstrate the major distributional patterns found in Iowa.

1) A complete list of wetland species recorded from only one or two counties in Iowa. All are very rare and some perhaps extinct in the state.

   Aster vimineus (Louisa & Muscatine), *Bidens beckii* (Cerro Gordo & Dickinson), *Bidens bipinnata* (Lee & Louisa), *Boehmeria drummondiana* (Muscatine), *Botrychium simplex* (Linn), *Calla palustris* (Linn), *Carex chordorrhiza* (Emmet & Hancock), *Carex limosa* (Emmet & Hancock), *Carex muricata* var. *cephalantha* (Hancock), *Carex tuckermani* (Jasper), *Chenopodium rubrum* (Clay), *Cirsium muticum* (Cerro Gordo & Clinton), *Decodon verticillatus* (Allamakee & Linn), *Drosera rotundifolia* (Hancock & Linn), *Elatine triandra* (Dickinson), *Eleocharis coloradoensis* (Clay & Palo Alto), *Eleocharis flavescens* var. *olivacea* (Johnson), *Eleocharis ovata* (Hancock), *Eleocharis pauciflora* var. *fernaldii* (Dickinson & Emmet), *Epilobium strictum* (Greene), *Eragrostis reptans* (Hardin), *Filipendula rubra* (Muscatine), *Floerkea proserpinacoides* (Dubuque), *Galium labradoricum* (Cerro Gordo), *Habenaria clavellata* (Fayette & Muscatine), *Heteranthera reniformis* (Lucas & Jefferson), *Hypericum boreale* (Linn), *Hypericum canadense* (Clay), *Isoetes melanopoda* (Clinton), *Juncus alpinus* (Dickinson & Harrison), *Ludwigia peploides* ssp. *glabrescens* (Lucas), *Marsilea mucronata* (Lyon), *Marsilea quadrifolia* (Decatur & Van Buren), *Mentha aquatica* (Johnson), *Mentha citrata* (Johnson), *Orontium aquaticum* (Linn), *Parnassia palustris* var. *neogaea* (Linn), *Penstemon calycosus* (Cedar), *Peltandra virginica* (Des Moines & Greene), *Plantago cordata* (Scott), *Pogonia ophioglossoides* (Linn), *Polygonum caespitosum* var. *longisetum* (Scott), *Potamogeton spirillus* (Hancock & Winnebago), *Potamogeton vaseyi* (Linn & Louisa), *Potentilla anserina* (Linn), *Proserpinica palustris* (Clinton & Muscatine), *Ranunculus gmelini* var. *hookeri* (Dickinson), *Sagittaria graminea* var. *cristata* (Emmet), *Salix candida* (Cerro Gordo & Johnson), *Salix pentandra* (Guthrie), *Salix purpurea* (Muscatine), *Salix sericea* (Henry & Johnson), *Salix subsericea* (Palo Alto), *Scheuchzeria americana* (Emmet), *Scirpus hallii* (Louisa & Muscatine), *Scirpus paludosus* (Dickinson & Palo Alto), *Scirpus smithii* (Cerro Gordo), *Scirpus torreyi* (Clinton), *Scleria verticillata* (Emmet), *Selanginella eclipes* (Muscatine), *Spiranthes romanzoffiana* (Dickinson & Emmet), *Solidago patula* (Muscatine), *Utricularia gibba* (Johnson & Muscatine), *Utricularia intermedia* (Clay & Emmet), *Veronica americana* (Lee & Winneshiek), *Veronica longifolia* (Linn).

2) Rare or infrequent species of scattered and local occurrence:

   Brasenia schreberi, Carex emoryi, Eleocharis wolfii, Equisetum sylvaticum, Heteranthera limosa, Iodanthus pinnatifidus, Mimulus glabratus var. *fremontii, Pilea fontana.*

3) Species occurring primarily along the Mississippi and Missouri Rivers, often also in the southern tiers of counties:

   Carex crus-corvi, Cyperus acuminatus, Echinodorus bertoroi var. *lanceolatus, Nelumbo lutea, Sagittaria montevidensis* ssp. *calycina.*

4) Species occurring primarily in the western half of the state:

   Leptochloa fascicularis, Lycopus asper, Ranunculus cymbalaria, Rumex maritimus.

5) Species occurring primarily in the eastern half of the state:

   Dryopteris cristata, Gratiola neglecta, Lobelia cardinalis, Onoclea sensibilis, Polygonum sagittatum, Pontederia cordata, Ribes americanum, Sagittaria rigida, Scleria triglomerata, Viola sagittata.

   A number of species of eastern Iowa, however, are largely restricted to east-central Iowa, an area roughly delimited by a line from Louisa county to Benton county to Dubuque county:

   Azolla mexicana, Chelone obliqua, Echinochloa walteri, Fimbristylis autumnalis, Gentiana crinita, Hemicarpha micrantha, Juncus marginatus, Myosurus minimus, Ranunculus recurvatus, Rhexia virginica, Osmunda cinnamomea, Osmunda regalis, Viola lanceolata, Viola macloskeyi ssp. *pallens, Xyris torta.*

6) Species occurring across the northern-most tiers of counties:

   Anacharis candensis, Carex alopecoidea, Carex diandra, Carex retrosa, Cyperus engelmanii, Epilobium palustre, Hierchloe odorata, Menyanthes trifoliata, Muhlenbergia glomerata, Populus balsamifera, Potamogeton amplifolius, Potamogeton epihydrus, Potentilla palustris, Sagittaria cuneata, Salix bebbiana, Salix pedicellaris, Vallisneria americana.

   The following species of northern Iowa are almost exclusively restricted to the Lakes Region of Clay, Dickinson, Emmet, and Palo Alto counties:

   Beckmannia syzigachne, Berula erecta, Callitriche palustris, Carex synchocephala, Glyceria borealis, Hippuris vulgaris, Lobelia kalmii, Muhlenbergia asperifolia, Myriophyllum heterophyllum, Populus deltoides var. *occidentale, Potamogeton gramineus, Potamogeton praelongus, Potamogeton richardsonii, Rynchospora capillacea, Scolochloa festucacea, Triglochin maritima, Triglochin palustris, Utricularia minor.*

7) Species occurring primarily within the southeastern half of Iowa, an area roughly delimited by a line from Fremont county to Allamakee county:

   Alopecurus carolinianus, Aster lateriflorus, Betula nigra, Bidens tripartita, Cardamine douglassii, Carex grayii, Carex shortiana, Carex squarrosa, Carex tribuloides, Carex typhina, Cephalanthus occidentalis, Eleocharis atropurpurea, Gratiola virginiana, Hibiscus militaris, Hypericum multilum, Justicia americana, Ludwigia alternifolia, Mimulus alatus, Peplis diandra, Potamogeton diversifolius, Rorippa sessiliflora, Rotala ramosior.

8) Species occuring primarily in the northeastern half of Iowa, an area roughly delimited by a line from Lee to Lyon counties:

   Acorus calamus, Alnus rugosa, Betula glandulosa var. *glandulifera, Betula lutea, Caltha palustris, Campanula aparinoides, Carex buxbaumii, Carex suberecta, Chelone glabra, Cicuta bulbifera, Dulichium arundinaceum, Eleocharis tenuis, Epilobium coloratum, Epilobium palustre, Equisetum fluviatile, Eriophorum angustifolium, Gerardia purpurea, Habenaria psychodes, Nuphar luteum, Nymphaea tuberosa, Parnassia glauca, Pedicularis lanceolata, Polygonum natans, Rumex orbiculatus, Sagittaria cuneata, Salix petiolaris, Saxifraga pennsylvanica, Thelypteris palustria, Viola nephrophylla, Zizania aquatica.*

9) Common and abundant species found throughout Iowa:

   Alisma subcordatum, Ascelpias incarnata, Calamogrostis canadensis, Carex stipata, Carex stricta, Carex vulpinoidea, Ceratophyllum demersum, Cyperus esculentus, Eleocharis acicularis, Eleocharis obtusa, Equisetum arvense, Equisetum hyemale, Eragrostis hypnoides, Iris virginica var. *shrevei, Lemna minor, Lindernia dubia, Lippia lanceolata, Lobelia syphilitica, Lycopus americanus, Lythrum dacotanum, Mentha arvensis, Mimulus ringens, Penthorum sediodes, Polygonum coccineum, Polygonum hydropiper, Potamogeton foliosus, Potamogeton nodosus, Potamogeton pectinatus, Rorippa islandica, Sagittaria engelmanniana* var. *brevirostra, Sagittaria latifolia, Salix interior, Salix nigra, Salix rigida, Scirpus atrovirens, Scirpus validus, Sparaganium eurycarpum, Spartina pectinata, Spirodela polyrhiza, Stachys palustris, Teucrium canadense* var. *occidentale,*

Typha latifolia, Viola papilionacea.

IOWA WETLAND TYPES

The purpose of this section is to briefly describe the types of wetlands found in Iowa and to provide a list of the dominant, common, and(or) characteristic species of each type. Whenever a species in a list has a restricted geographical range in the state, the range is given in parenthesis after the species where (N) means northern half of the state, (NW) the northwestern part of the state, etc. These lists of species were compiled from published papers cited in the descriptions of wetland types and from our own field experience. Not all the species in these lists will be present in any given example of a wetland type, and most species are found in two or more wetland types.

I. OPEN WATER.

Slow-moving rivers, ponds, lakes, sloughs, oxbows, and backwaters support a considerable number of submersed aquatic plants. Many of these are totally submersed, often bearing finely dissected leaves (i.e., *Myriophyllum, Ceratophyllum*); others are rooted in the substrate and possess floating leaves (i.e., the water-lilies and certain *Potamogeton*); others, such as the duckweeds (*Lemna, Spirodela,* and *Wolffia*) and the pteridophyte *Azolla,* float free on the water's surface. The distribution maps for these species indicate in many cases a scattered distribution across Iowa. This may be due to a paucity of suitable habitats in certain areas and to the fact that these plants are often overlooked unless the collecter is specifically looking for them. References: Crum and Bachmann (1973), Sigler (1948), Volker and Smith (1965), and Wylie (1920).

Species:

Anacharis canadensis (N)
Anacharis nuttallii
Armoracia aquatica (E)
Azolla mexicana (E)
Bidens becki (N)
Brasenia schreberi
Callitriche heterophylla (E, NW)
Callitriche palustris (NW)
Ceratophyllum demersum
Elatine triandra (NW)
Hippuris vulgaris (N)
Lemna minor
Lemna trisulca
Myriophyllum heterophyllum (NW)
Myriophyllum pinnatum (S, E)
Myriophyllum spicatum
Najas flexilis
Najas guadalupensis
Nelumbo lutea (Miss., Mo.)
Nuphar luteum ssp. *variegatum*
Nymphaea tuberosa
Peplis diandra (SE)
Potamogeton amplifolius (N)
Potamogeton berchtoldii (NW)
Potamogeton crispus (Miss.)
Potamogeton diversifolium (SE)
Potamogeton epihydrus (N)
Potamogeton foliosus
Potamogeton friesii (NW, C)
Potamogeton gramineus (NW, C)
Potamogeton illinoensis
Potamogeton natans (N, E)
Potamogeton nodosus
Potamogeton pectinatus
Potamogeton praelongus (N)
Potamogeton pusillus
Potamogeton richardsonii (N)
Potamogeton spirillus (N)
Potamogeton strictifolius (N)
Potamogeton vaseyi (E)
Potamogeton zosteriformis
Proserpinaca palustris (E)
Ranunculus flabellaris
Ranunculus longirostris
Spirodela polyrhiza
Utricularia gibba (E)
Uticularia intermedia (NW)
Utricularia minor (NW)
Utricularia vulgaris
Vallisneria americana (N)
Wolffia columbiana (E)
Wolffia punctata
Zannichellia palustris (NW, SE)
Zosterella dubia

II. MARSHES

This vegetation type is found in shallow areas of lakes and ponds and on poorly drained river floodplains where the inorganic mineral soil is submerged at least part of the year. The dominant species are characteristically herbaceous emergents (*Typha* spp., *Scirpus* spp., *Sparganium* spp., *Phragmites communis*). This wetland type is best developed in the geologically youngest, most poorly drained areas of Iowa, the Cary lobe of the Wisconsin glaciation in northern and central Iowa. The soil of these areas is a heavy loam or muck, or occasionally silt; this is in contrast to the sandy substrate of certain marshes in eastern Iowa, or the organic peat soils of bogs and fens. In Iowa, swamps are sometimes distinguished from marshes on the basis of water level (Hayden, 1943; p. 303); swamps are then defined by Hayden as communities on mineral soil where water level exceeds soil level, and marshes as communities on mineral soil where water level roughly coincides with soil level. Because of Iowa's climate, however, an area considered a swamp in April by Hayden might be a marsh or even "low prairie" by September. All wetlands dominated by herbaceous emergents are classified by us as marshes, except sand marshes (see following type). References: Hayden (1943), Van Dyke (1972), van der Valk and Davis (1976a, 1978), Weller and Spatcher (1965), and Weller and Fredrickson (1974).

Species:

Acorus calamus
Alisma subcordatum
Alopecurus aequalis
Beckmannia syzigachne (NW)
Bidens cernua
Bidens tripartita
Bidens frondosa
Boltonia asteroides
Calamagrostis canadensis
Caltha palustris
Carex annectans
Carex atherodes
Carex hystericina
Carex sartwellii
Carex stricta
Carex vulpinoidea
Cuscuta sp.
Echinochloa walteri (E)

Eleocharis obtusa
Eleocharis macrostachya
Epilobium glandulosum
Glyceria borealis (NW)
Glyceria grandis
Glyceris septentrionalis (SE & C)
Iris virginica var. *shrevei*
Mentha arvensis
Menyanthes trifoliata (N)
Mimulus ringens
Penthorum sedoides
Phalaris arundinacea
Phragmites communis
Polygonum coccineum
Polygonum natans
Pontederia cordata (SE)
Ranunculus cymbalaria (W)
Ranunculus pennsylvanicus (NE)
Ranunculus scleratus
Rumex maritimus (W)
Rumex orbiculatus (NE)
Sagittaria cuneata (N)
Sagittaria engelmanniana ssp. *brevirostra*
Sagittaria latifolia
Sagittaria rigida (E)
Scirpus atrovirens
Scirpus fluviatilis
Scirpus heterochaetus
Scirpus validus
Scolochloa festucacea
Sparganium eurycarpum
Typha angustifolia
Typha x *glauca*
Typha latifolia
Zizania aquatica

III. SAND MARSHES.

These communities are found around the margins of small shallow ponds and sloughs and in low wet depressions in the sand praires along the Mississippi and Cedar rivers in east-central and southeastern Iowa. These habitats support a special assemblage of plant species that are hydrophytic and psammophilic. Owing to the sandy substrate, the vegetation differs substantially from marsh vegetation growing on heavy loam or clay soils. Several very rare species with Atlantic Coastal Plain affinities are known in the state only from these wet sandy marshes and swales in southeastern Iowa. There are no published papers on these sand marshes. A general discussion of the sand flora of Iowa is found in Conard (1952). See also Crum (1972).

Species:

Ammania coccinea
Anemone caroliniana
Anemone canadensis
Aster umbellatus
Aster vimineus
Bidens discoidea
Bidens frondosa
Carex buxbaumii
Carex cristatella
Carex haydenii
Carex interior
Carex scoparia
Carex stricta
Cyperus aristatus
Cyperus erythrorhizos
Cyperus odoratus
Cyperus rivularis
Eleocharis acicularis
Eleocharis atropurpurea
Eleocharis calva
Eleocharis flavescens var. *olivacea*
Eleocharis macrostachya
Eleocharis wolfii
Filipendula rubra
Fimbristylis autumnalis
Gerardia purpurea
Glyceria septentrionalis
Gratiola virginiana
Habenaria flava
Hemicarpha micrantha
Hibiscus militaris
Hypericum majus
Hypericum mutilum
Iris virginica var. *shrevei*
Juncus acuminatus
Juncus canadensis
Juncus effusus
Juncus greenei
Juncus marginatus
Lathyrus palustris
Lindernia dubia
Lobelia syphilitica
Ludwigia alternifolia
Ludwigia palustris
Ludwigia polycarpa
Myosurus minimus
Oenothera pilosella
Onoclea sensibilis
Osmunda cinnamomea
Osmunda regalis
Penstemon digitalis
Physostegia virginiana
Pontederia cordata
Polygonum hydropiperoides
Ranunculus scleratus
Rhexia virginica
Rorippa sessiliflora
Rotala ramosior
Sagittaris graminea
Sagittaria montevidensis ssp. *calycina*
Salix petiolaris
Scirpus atrovirens
Scirpus cyperinus
Scirpus hallii
Scirpus validus
Thelypteris palustris
Typha latifolia
Viola lanceolata
Viola macloskeyi ssp. *pallens*
Viola sagittata
Xyris torta

IV. WET MEADOWS

This wetland type is transitory between marshes and low prairie. Water level rarely exceeds soil level except during the spring. Although there is usually no standing water in a wet meadow, the soils are waterlogged all year. *Typha,* the dominant species in marshes, is replaced by species of *Carex* or grasses in wet meadows. In eastern Iowa, wet meadows most frequently occur along major streams; in

northern Iowa, they are often found along the edge of glacial lakes and ponds, or in low areas in prairies, i.e., the swales. There are no published papers describing this wetland type in Iowa. Iowa's wet meadows, however, seem similar to those described by Curtis (1959) for Wisconsin and Stewart and Kantrud (1971) for North Dakota.

Species:

Anemone canadensis
Asclepias incarnata
Aster novae-angliae
Aster simplex
Aster umbellatus
Bidens cernua
Bidens vulgata
Calamagrostis canadensis
Caltha palustris
Campanula aparinodes
Carex annectans
Carex atherodes
Carex bebbii
Carex buxbaumii
Carex haydenii
Carex lasiocarpa
Carex prarisa
Carex sartwellii
Cares scoparia
Carex stipata
Carex stricta
Carex tetanica
Carex tribuloides
Carex trichocarpa
Carex vulpinoidea
Cicuta maculata
Eleocharis compressa
Eleocharis obtusa
Epilobium coloratum
Erechtites hieracifolia
Gentiana andrewsii
Gerardia purpurea
Gerardia tenuifolia
Glyceria striata
Gratiola neglecta
Habenaria leucophaea
Habenaria psychodes (NE)
Hypericum majus (E)
Hypericum mutilum (SE)
Iris virginica var. *shrevei*
Juncus dudleyi
Lathyrus palustris
Leersia oryzoides
Lilium canadense ssp. *michiganense*
Lobelia siphilitica
Ludwigia alternifolia
Lycopus americanus
Lysimachia quadrifolia
Lysimachia terrestris
Lysimachia thyrsiflora
Lythrum dacotanum
Mimulus ringens
Onoclea sensibilis
Pedicularis lanceolata
Penstemon digitalis (SE)
Penthorum sedoides
Phalaris arundinacea
Poa palustris
Ranunculus septentrionalis
Salix petiolaris (NE)
Saxifraga pennsylvanica
Solidago gigantea
Solidago graminifolia
Sparganium eurycarpum
Spartina pectinata
Spiraea alba
Spiranthes cernua
Thelypteris palustris
Verbena hastata
Vernonia fasciculata
Viola nephrophylla
Viola sagittata
Viola papilionacea

V. ALLUVIAL FORESTS

These woodlands, consisting largely of deciduous softwood tree species with a herb understory, are located along major streams on the primary bottoms subject to periodic flooding. This community is best developed in the eastern half of Iowa, along the Mississippi River and its major tributaries; species diversity seems to decline across Iowa from southeast to northwest. There have been no studies of this wetland type in Iowa since those of Aikman and Gilly (1948).

Species:

(A) Trees
Acer negundo
Acer saccharrinum
Alnus rugosa (NE)
Betula lutea (NE)
Betula nigra (SE)
Carya illinoensis (SE)
Carya lacinosa (SE)
Carya x *nussbaumeri* (SE)
Celtis occidentalis
Fraxinus nigra (E)
Gleditsia tricanthos
Gymnocladus dioica
Juglans nigra
Platanus occidentalis
Populus deltoides
Quercus bicolor
Quercus palustris
Salix amygdaloides
Ulmus americana

(B) Shrubs and vines
Amorpha fruticosa
Cornus obliqua
Salix interior
Salix nigra
Salix rigida
Smilax hispida
Toxicodendron radicans
Vitis cinerea
Vitis riparia

(C) Herbs
Amaranthus tamariscinus
Anemone canadensis
Arisaema dracontium
Aster furcatus (S)
Aster ontarionis
Bidens cernua
Biden frondosa
Boehmeria cylindrica

Carex grayii (SE)
Carex lupulina
Carex retrosa (N)
Carex squarrosa (SE)
Carex stipata
Chelone obliqua (E)
Chenopodium standleyanum
Dryopteris cristata (NE)
Equisetum hyemale
Eragrostis frankii
Eragrostis hypnoides
Galium aparine
Hibiscus militaris (SE)
Impatiens capensis
Impatiens pallidus
Iodanthus pinnatifidus
Laportea canadensis
Leerisa lenticularis (E)
Leersia virginica
Lilium canadense ssp. *michiganense*
Lippia lanceolata
Lobelia cardinalis
Lythrum dacotanum
Mimulus alatus (SE)
Muhlenbergia mexicana
Penthorum sedoides
Physostegia virginiana
Pilea pumila
Polygonum pennsylvanicum
Ranunculus abortivus
Ranunculus recurvatus (E)
Ranunculus septentrionalis
Scutellaria lateriflora
Solidago gigantea
Stachys tenuifolia
Urtica dioica
Verbena hastata
Vernonia fasciculata
Viola papilionacea

VI. FENS

This wetland type is characteristic of the Lakes Region of northwestern Iowa. Fens are found on hillsides where very alkaline groundwater comes to the surface. The soil of these fens is peat that contains a mixture of undecayed plant debris and marl precipitated when the water reaches the surface. Some of the plants listed are quite rare in Iowa and restricted to fen habitats; most species, however, are also found in marsh, swale, or lowland prairie communities. References: Conard (1952), Holte (1966), Holte and Thorne (1962) and van der Valk (1975a, b, 1976).

Species:

Aster junciformis
Aster umbellatus
Berula erecta
Calamogrostis inexpansa
Caltha palustris
Cardamine bulbosa
Carex aquatilis
Carex hystericina
Carex interior
Carex lacustris
Carex limosa
Carex prarisa
Carex sartwellii
Carex stipata
Carex stricta
Carex tetanica
Chelone glabra
Cypripedium candidum
Cypripedium reginae
Eleocharis calva
Eleocharis compressa
Eleocharis pauciflora var. *fernaldii*
Epilobium coloratum
Epilobium glandulosum
Epilobium palustre
Eriophorum angustifolium
Eupatorium maculatum
Eupatorium perfoliatum
Gentiana procera
Gerardia purpurea
Gratiola neglecta
Habenaria hyperborea
Hierchloe odorata
Juncus alpinus
Juncus balticus
Juncus x *nodosiformis*
Juncus nodosus
Liparis loesselii
Lobelia kalmii
Muhlenbergia asperifolia
Muhlenbergia glomerata
Parnassia glauca
Pedicularis lanceolata
Phragmites communis
Pilea fontana
Ranunculus pennsylvanicus
Ranunculus scleratus
Rhynchospora capillacea
Salix bebbiana
Salix discolor
Salix subsericea
Scheuchzeria americana
Scirpus americanus
Scirpus validus
Scleria verticillata
Solidago graminifolia
Spiranthes romanzoffiana
Typha angustifolia
Typha latifolia
Viola nephrophylla

VII. HANGING BOGS

This wetland type is found primarily in eastern Iowa. Although hanging bogs are geologically similar to the fens of northwestern Iowa, the vegetation is quite different. Like fens, they are usually situated part way up a slope, where ground water seeps out of the hillside. The soil reaction of a hanging bog is not nearly so alkaline as that of a fen; it is more often neutral to slightly acidic. Fens, located in areas where prairie is the predominant vegetation, eventually give way on the slopes and ridges above and below them to grasslands; hanging bogs, occurring in areas where deciduous forest is most frequent, eventually give way to mesophytic woodlands. Additionally, much of the flora of a fen is composed of species with boreal associations, whereas much of the flora of the hanging bogs of eastern Iowa is composed of species with eastern or Atlantic Coastal Plain affiliations. There seems to be no published literature on hanging bogs in Iowa.

Species:

Alopecurus aequalis
Aster puniceus
Aster umbellatus
Aster vimineus
Boehmeria drummondiana
Campanula aparanoides
Cardamine bulbosa
Carex cristatella
Carex hystericina
Chelone glabra
Cornus stolonifera
Cypripedium candidum
Epilobium coloratum
Gentiana andrewsii
Gentiana crinita
Impatiens capensis
Impatiens pallida
Lysimachia quadrifolia
Mimulus ringens
Muhlenbergia mexicana
Oenothera pilosella
Pedicularis lanceolata
Ribes americanum
Rumex orbiculatus
Salix discolor
Salix petiolaris
Saxifraga pennsylvanica
Scutellaria gallericulata
Selaginella eclipes
Symplocarpus foetidus
Thelypteris palustris
Viola nephrophylla

VIII. SPHAGNUM MATS

Perhaps one of the most interesting wetland types in Iowa is that of the sphagnum mat. Only one good example of this type, more frequent to the north in Minnesota and Wisconsin, exists in Iowa. A floating spongy mat, composed of species of *Sphagnum, Polytrichum, Aulocomnium,* and *Helodium,* covers three acres of eight-acre Dead Man's Lake at Pilot Knob State Park in Hancock county. The vegetation growing on this moss substrate is similar to that of peat bogs; several very rare species are found on the mat, the most notable of which is the insectivorous sundew, *Drosera rotundifolia.* This species is known from elsewhere in Iowa only by an old, questionable specimen from Linn county. Further information on this unusual plant community is given by Grant and Thorne (1955), who were responsible for the discovery of this habitat in 1954, and Smith (1962).

Species:

Acorus calamus
Alopecurus aequalis
Asclepias incarnata
Aster junciformis
Calamogrostis canadensis
Campanula aparinoides
Carex chordorrhiza
Carex comosa
Carex cristatella
Carex lacustris
Carex lasiocarpa
Carex limosa
Carex muricata var. *cephalantha*
Carex stipata
Cicuta bulbifera
Cyperus engelmanni
Drosera rotundifolia
Dryopteris cristata
Dulichium arundinaceum
Eleocharis macrostachya
Eleocharis obtusa
Eleocharis ovata
Epilobium coloratum
Epilobium palustre
Erechtites hieracifolia
Eriophorum gracile
Galium trifidum
Glyceria borealis
Glyceria striata
Iris virginica var. *shrevei*
Leersia oryzoides
Liparis loesellii
Lycopus americanus
Lycopus uniflorus
Lysimachia terrestris
Lysimachia thyrsiflora
Muhlenbergia glomerata
Poa palustris
Potentilla palustris
Rorippa islandica
Rumex orbiculatus
Sagittaria latifolia
Salix amygdaloides
Salix bebbiana
Salix discolor
Salix pedicellaris
Salix petiolaris
Scirpus cyperinus
Scirpus fluviatilis
Scirpus validus
Scutellaria gallericullata
Scutellaria lateriflora
Spiraea alba
Stachys palustris
Thelypteris palustris
Triadenum fraseri
Triglochin maritima
Typha latifolia
Verbena hastata

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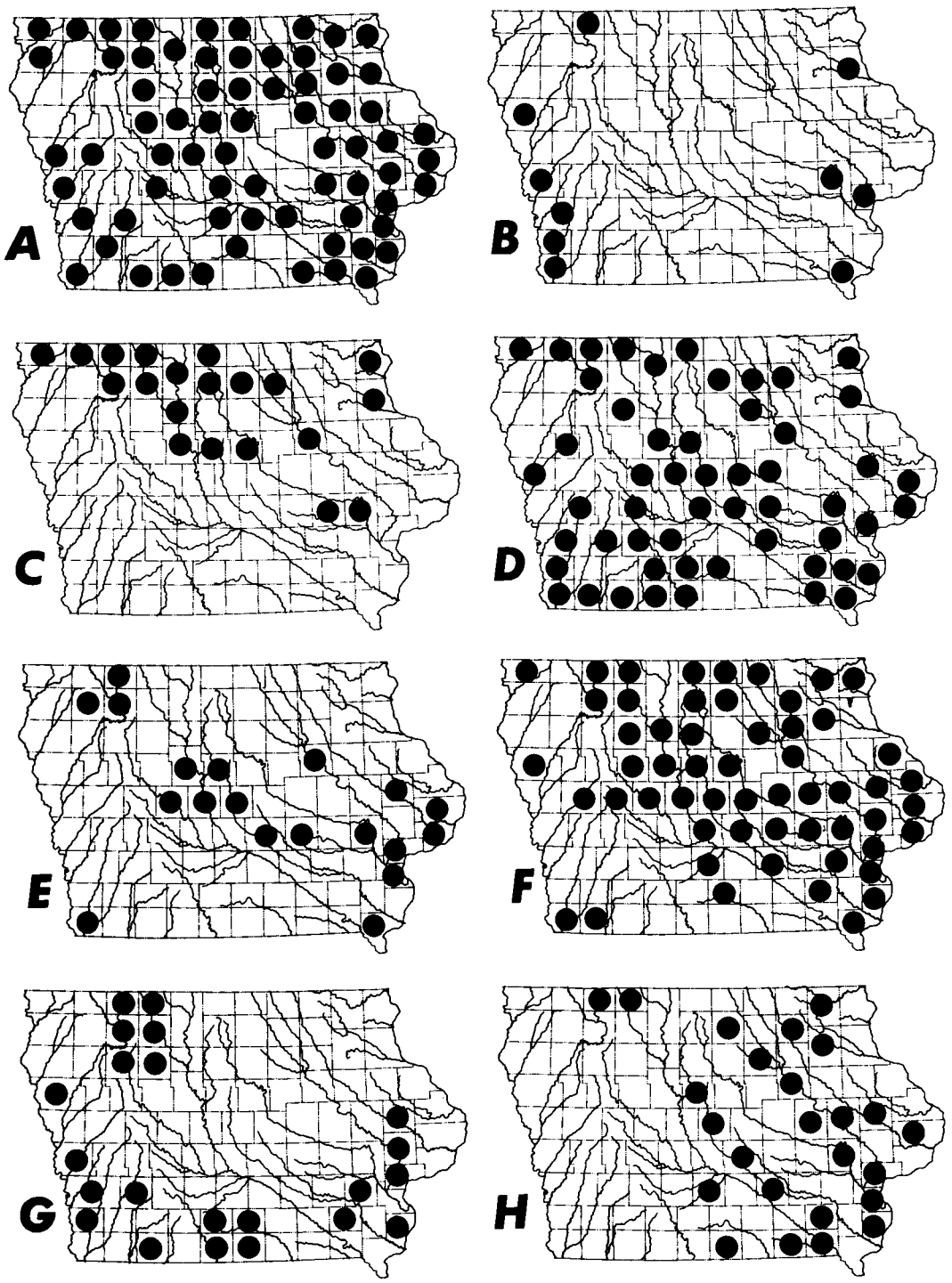

Plate 1. (A) *Alisma subcordatum*, (B) *Echinodorus bertoroi*, (C) *Sagittaria cuneata*. (D) *Sagittaria engelmanniana* spp. *brevirostra*, (E) *Sagittaria graminea*, (F) *Sagittaria latifolia*, (G) *Sagittaria montevidensis* spp. *calycina*, and (H) *Sagittaria rigida*.

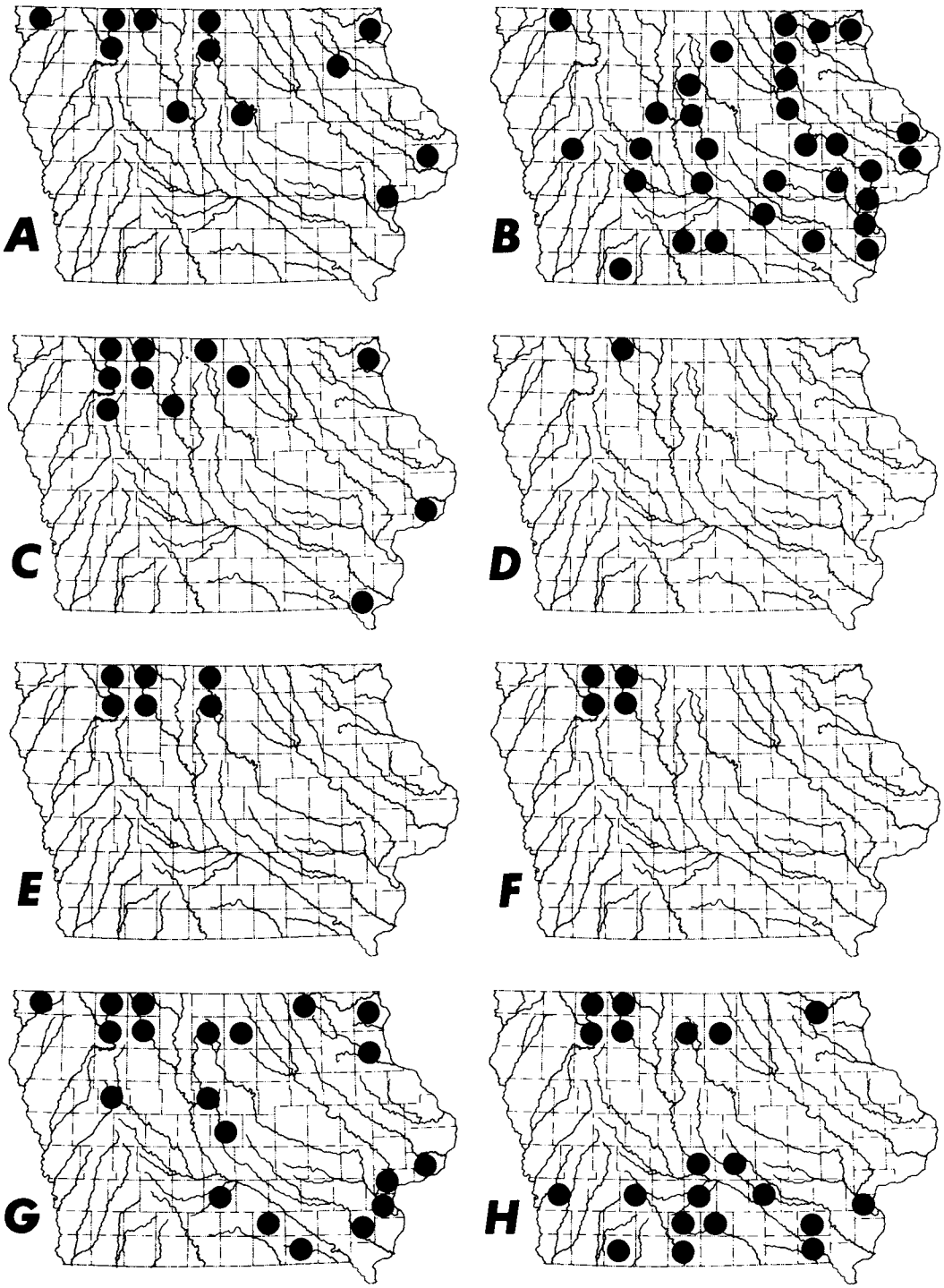

Plate 2. (A) *Anacharis canadensis*, (B) *Anacharis nuttallii*, (C) *Vallisneria americana*, (D) *Scheuchzeria americana*, (E) *Triglochin maritima*, (F) *Triglochin palustris*, (G) *Najas flexilis* and (H) *Najas guadalupensis*.

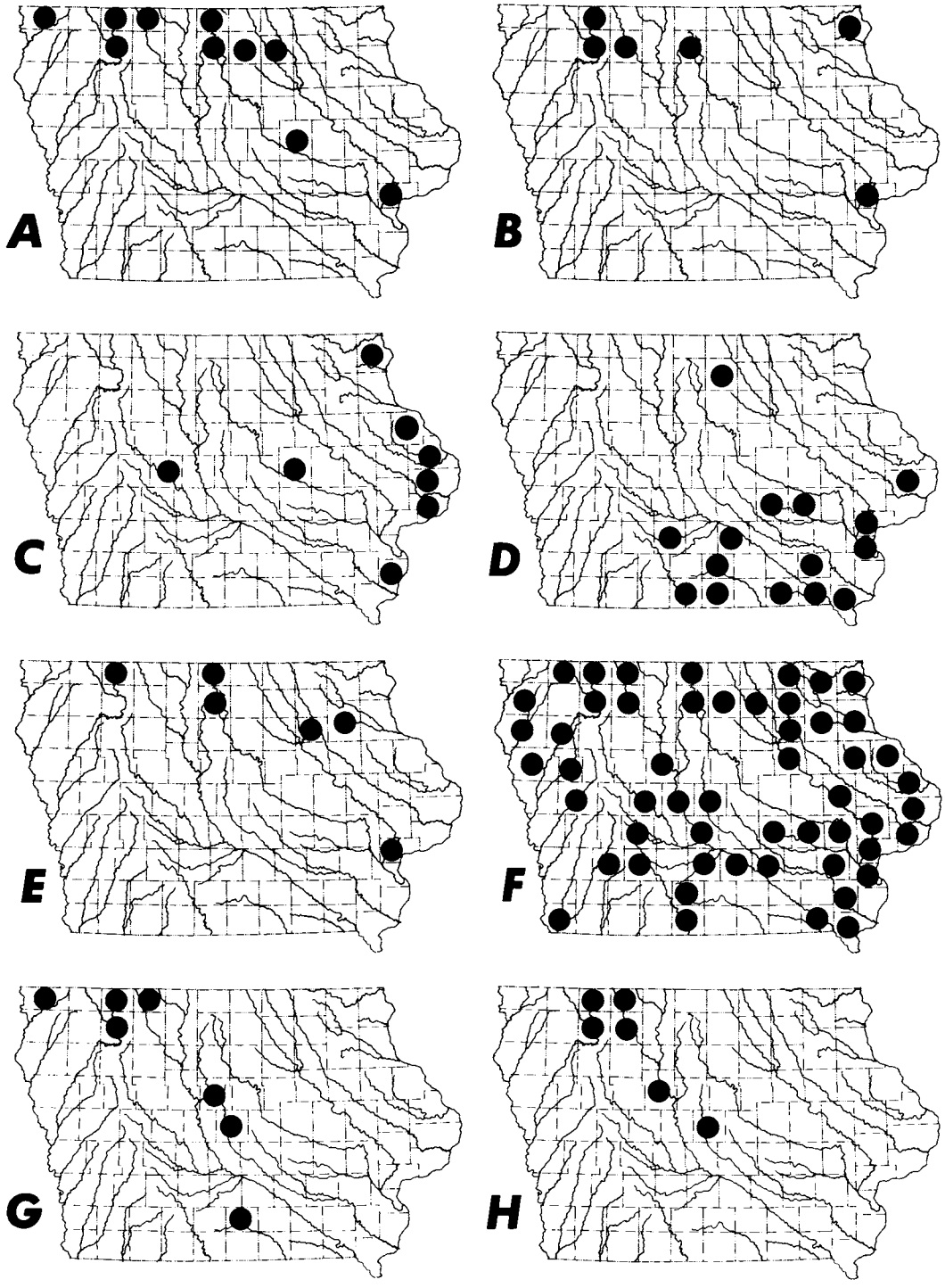

Plate 3. (A) *Potamogeton amplifolius*, (B) *Potamogeton berchtoldii*, (C) *Potamogeton crispus*, (D) *Potamogeton diversifolius*, (E) *Potamogeton epihydrus*, (F) *Potamogeton foliosus*, (G) *Potamogeton friesii*, and (H) *Potamogeton gramineus*.

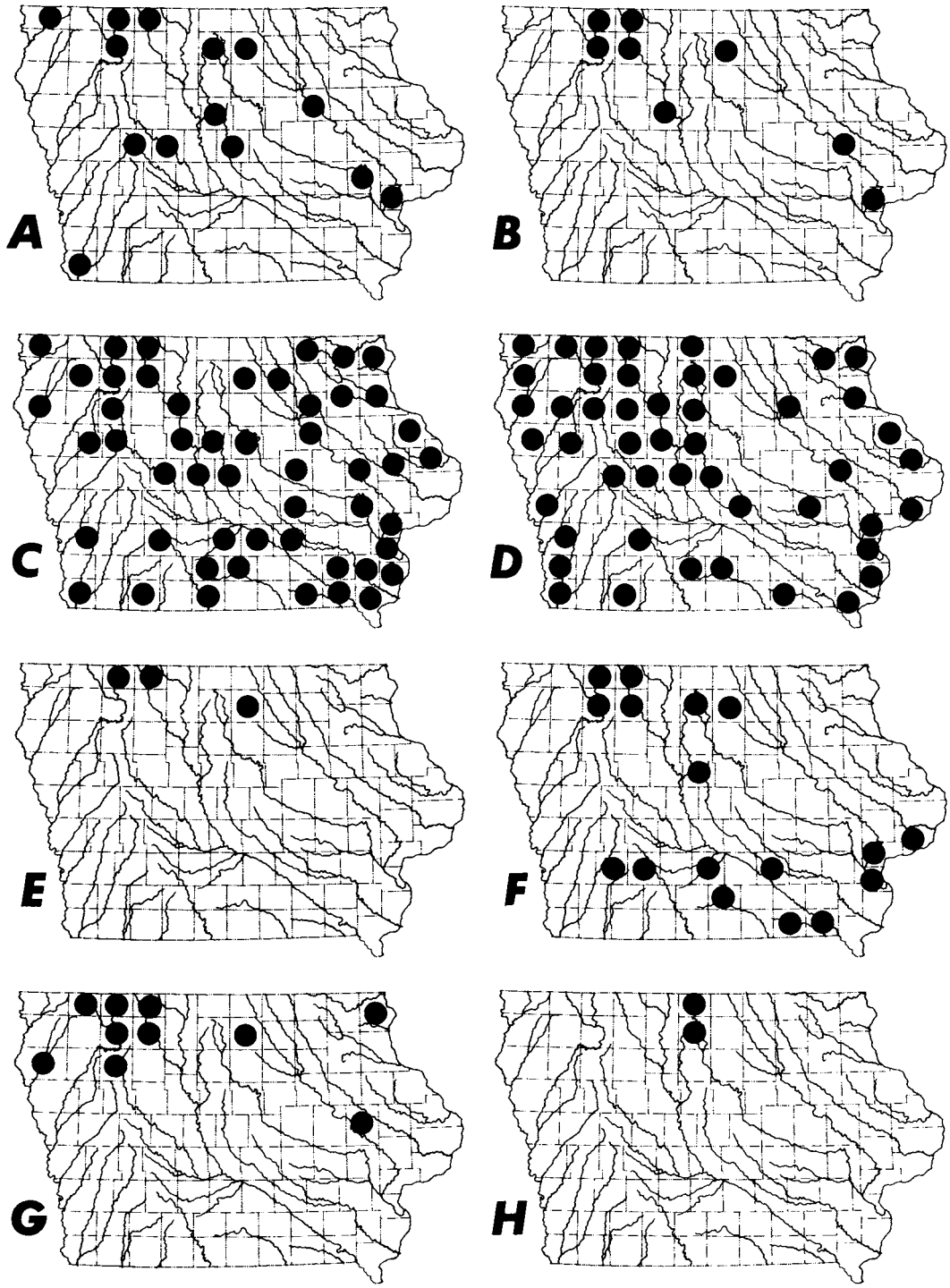

Plate 4. (A) *Potamogeton illinoensis*, (B) *Potamogeton natans*, (C) *Potamogeton nodosus*, (D) *Potamogeton pectinatus*, (E) *Potamogeton praelongus*, (F) *Potamogeton pusillus*, (G) *Potamogeton richardsonii*, and (H) *Potamogeton spirillus*.

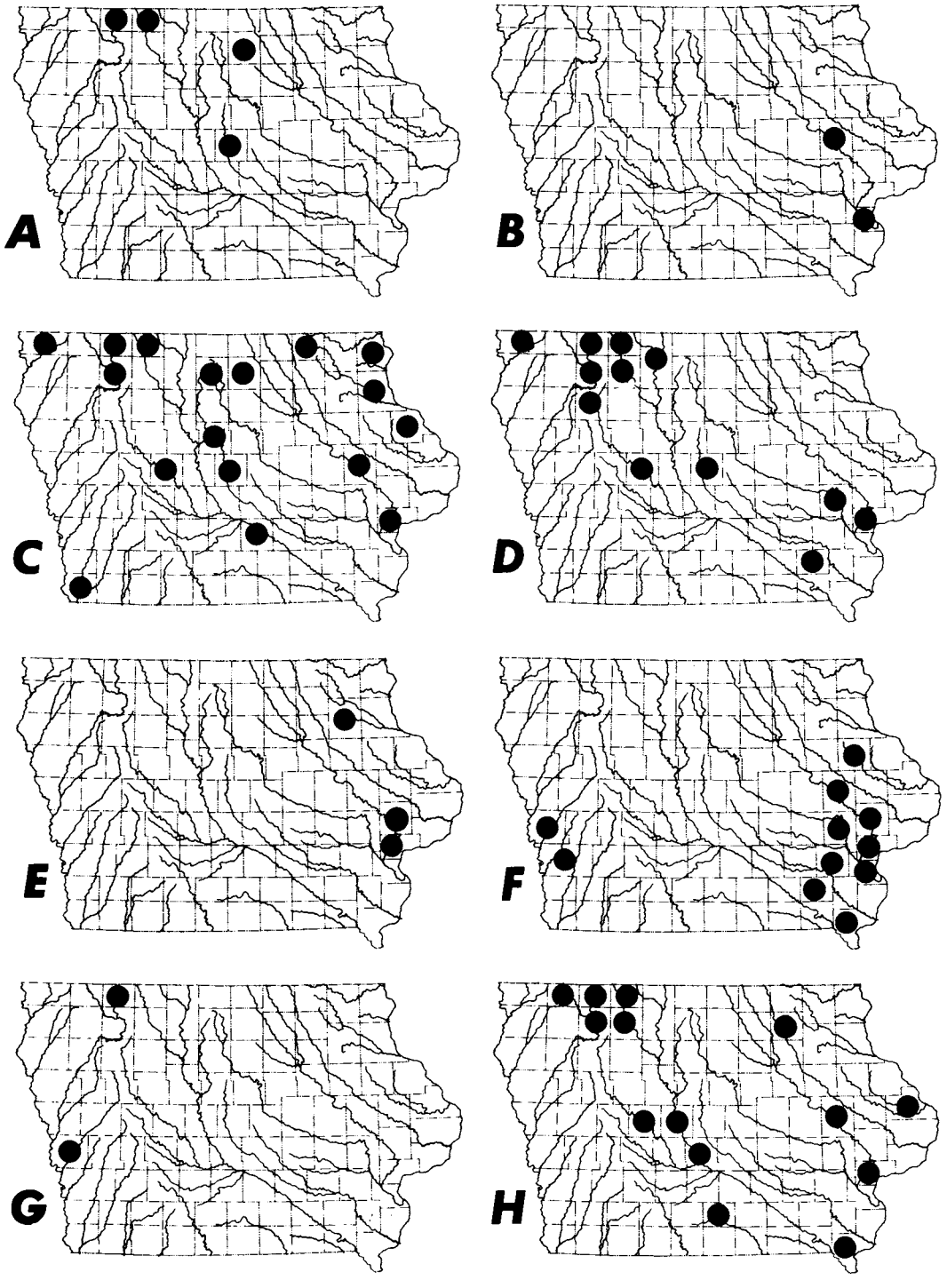

Plate 5. (A) *Potamogeton strictifolius*, (B) *Potamogeton vaseyi*, (C) *Potamogeton zosteriformis* (D) *Zannichellia palustris*, (E) *Xyris torta*, (F) *Juncus acuminatus*, (G) *Juncus alpinus*, and (H) *Juncus balticus*.

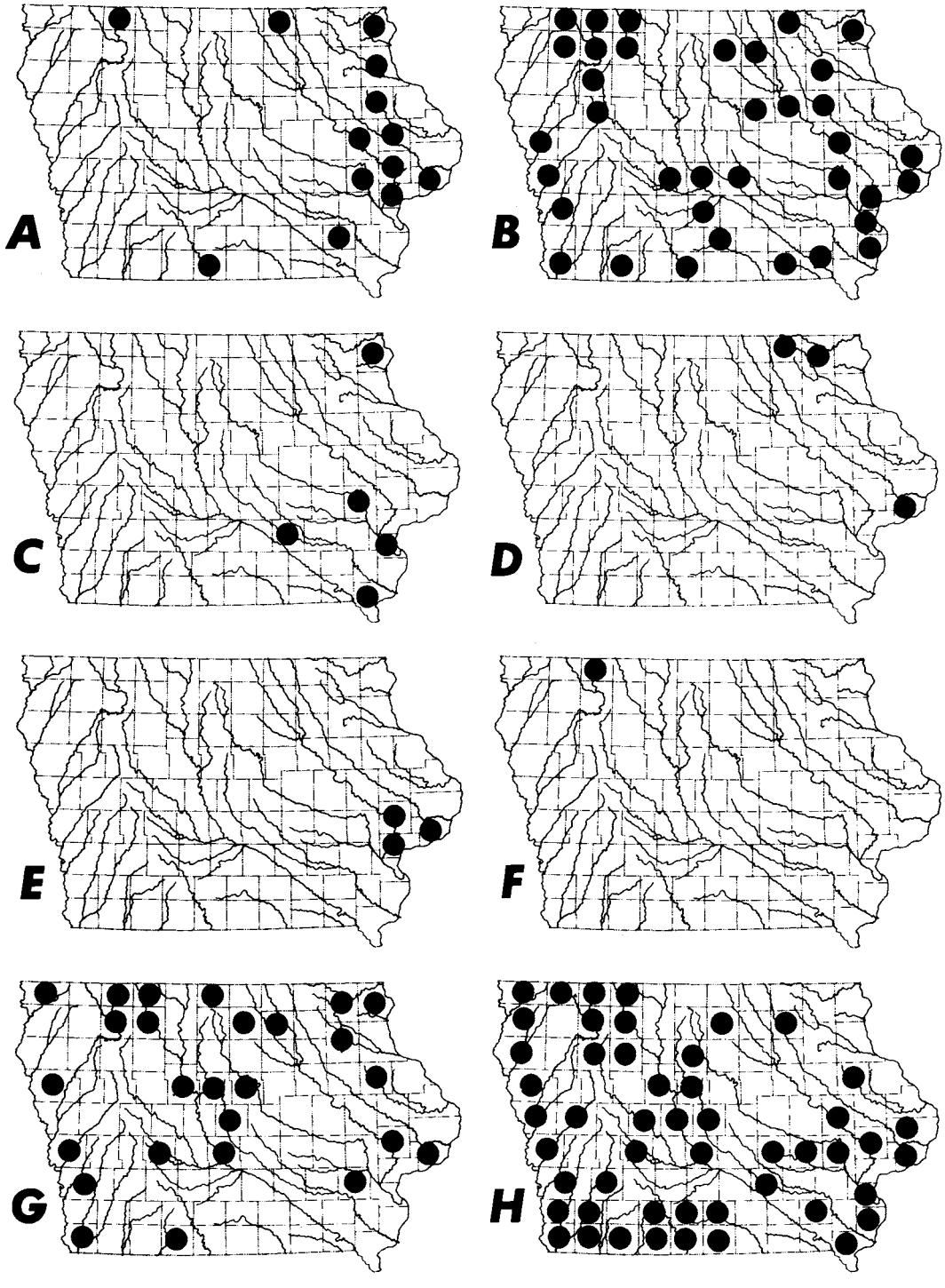

Plate 6. (A) *Juncus canadensis*, (B) *Juncus dudleyi*, (C) *Juncus effusus* var. *solutus*, (D) *Juncus greenei*, (E) *Juncus marginatus*, (F) *Juncus x nodosiformis*, (G) *Juncus nodosus*, and (H) *Juncus torreyi*.

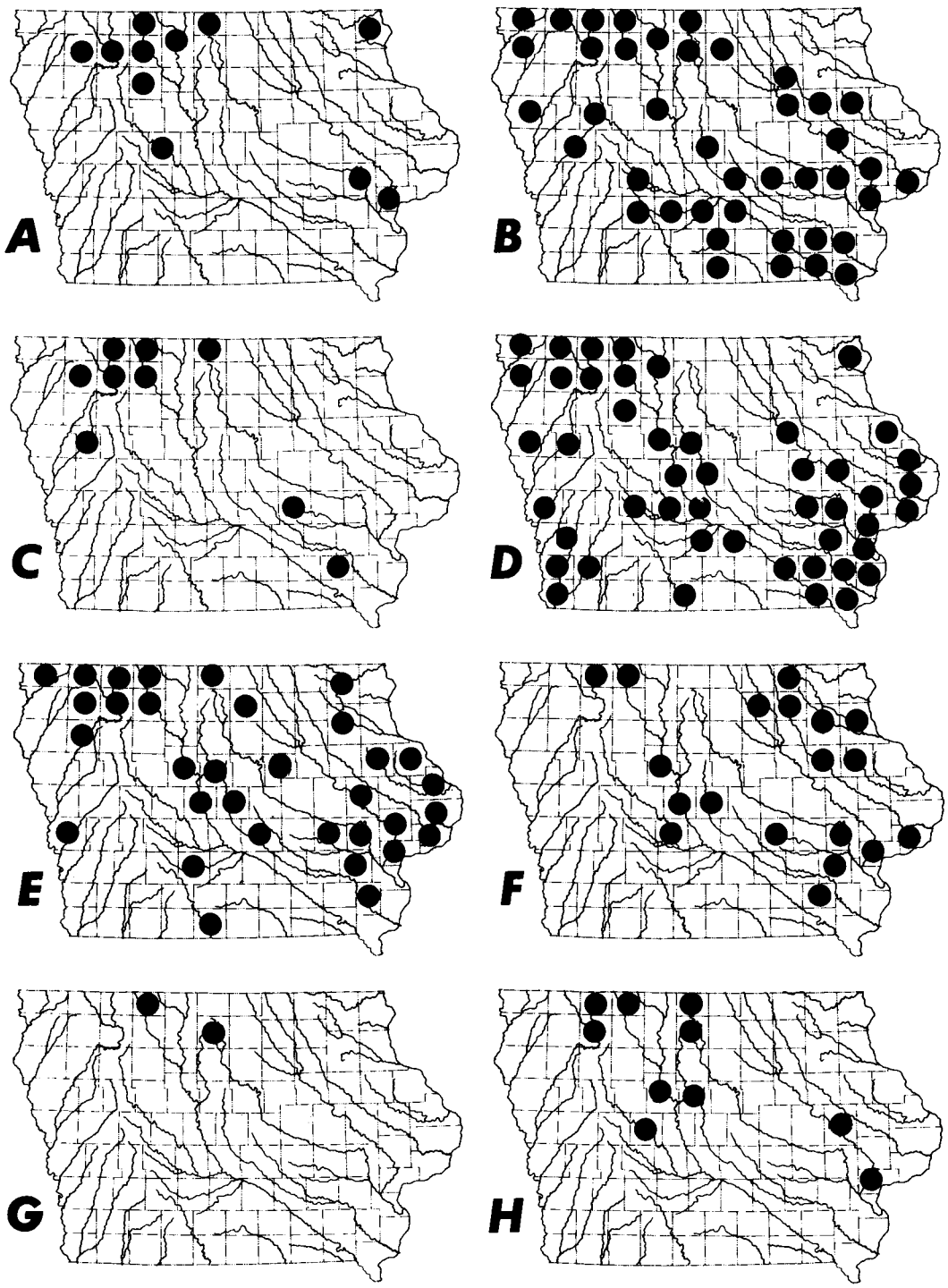

Plate 7. (A) *Carex alopecoidea*, (B) *Carex annectans*, (C) *Carex aquatalis* var. *altior*, (D) *Carex atherodes*, (E) *Carex bebii*, (F) *Carex buxbaumii*, (G) *Carex chordorrhiza*, and (H) *Carex comosa*.

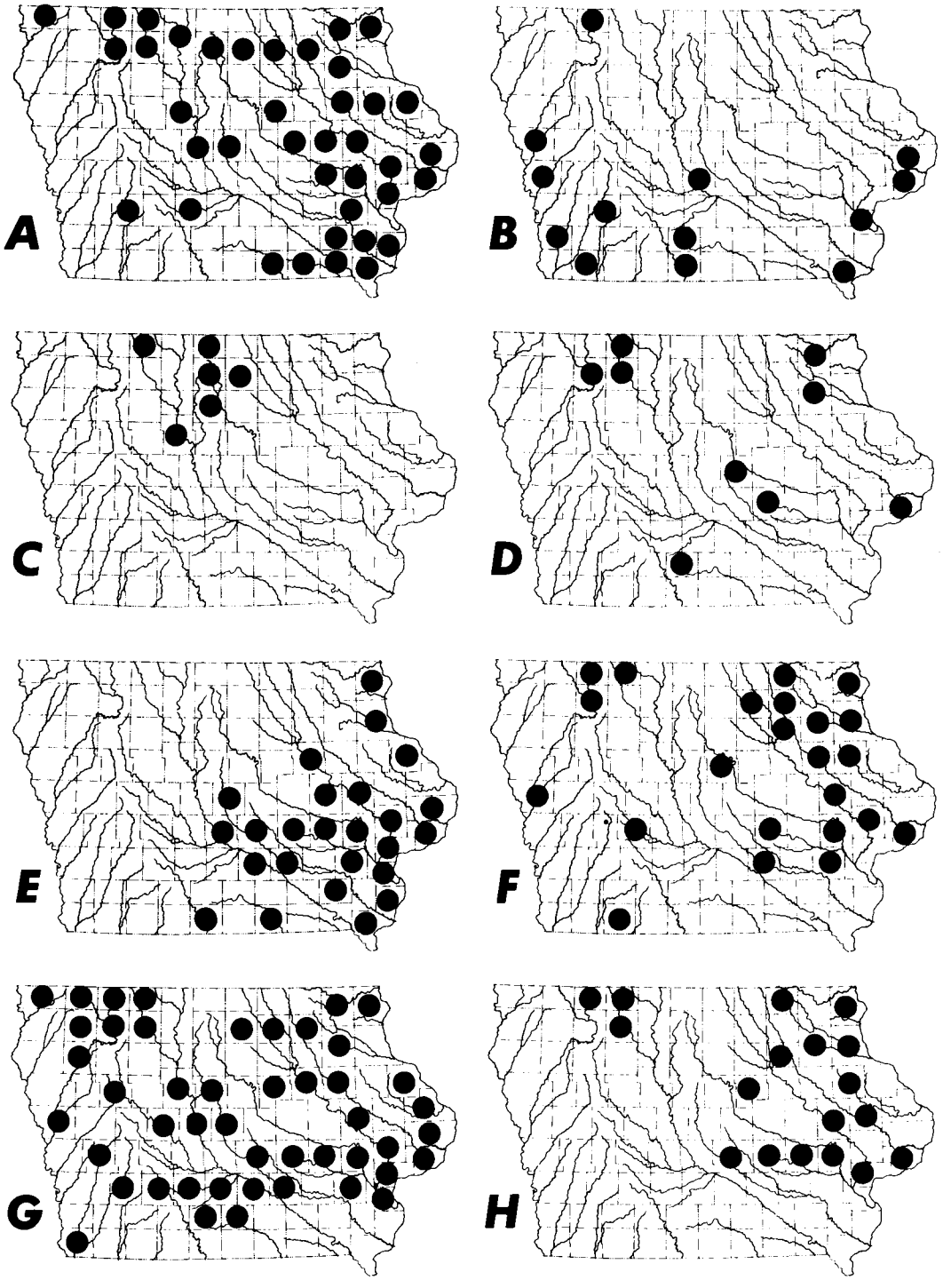

Plate 8. (A) *Carex cristatella*, (B) *Carex crus-corvi*, (C) *Carex diandra*, (D) *Carex emoryi*, (E) *Carex grayii*, (F) *Carex haydenii*, (G) *Carex hystericina*, and (H) *Carex interior*.

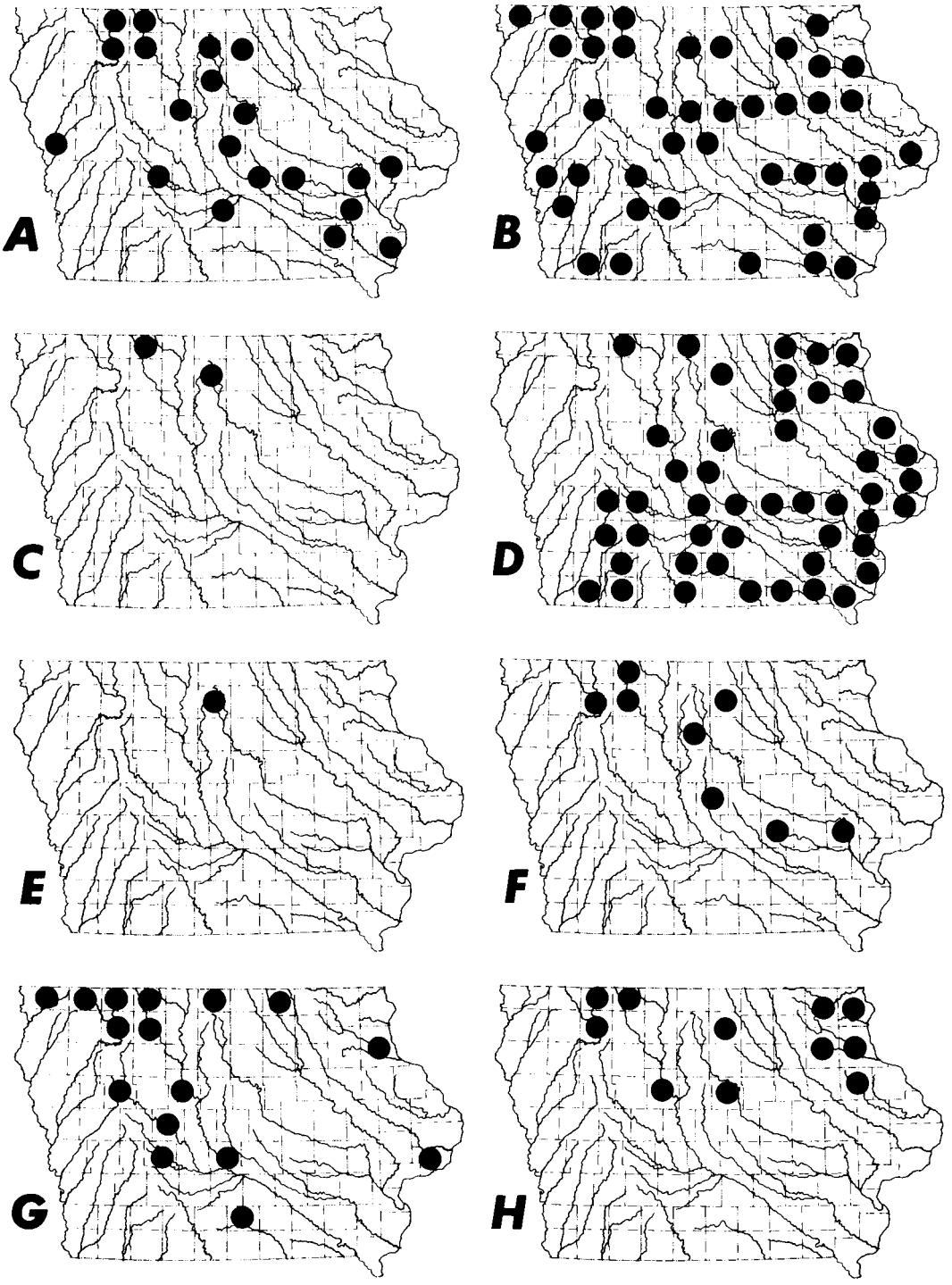

Plate 9. (A) *Carex lacustris*, (B) *Carex lasiocarpa*, (C) *Carex limosa*, (D) *Carex lupulina*, (E) *Carex muricata*, (F) *Carex prarisa*, (G) *Carex praegracilis*, and (H) *Carex retrosa*.

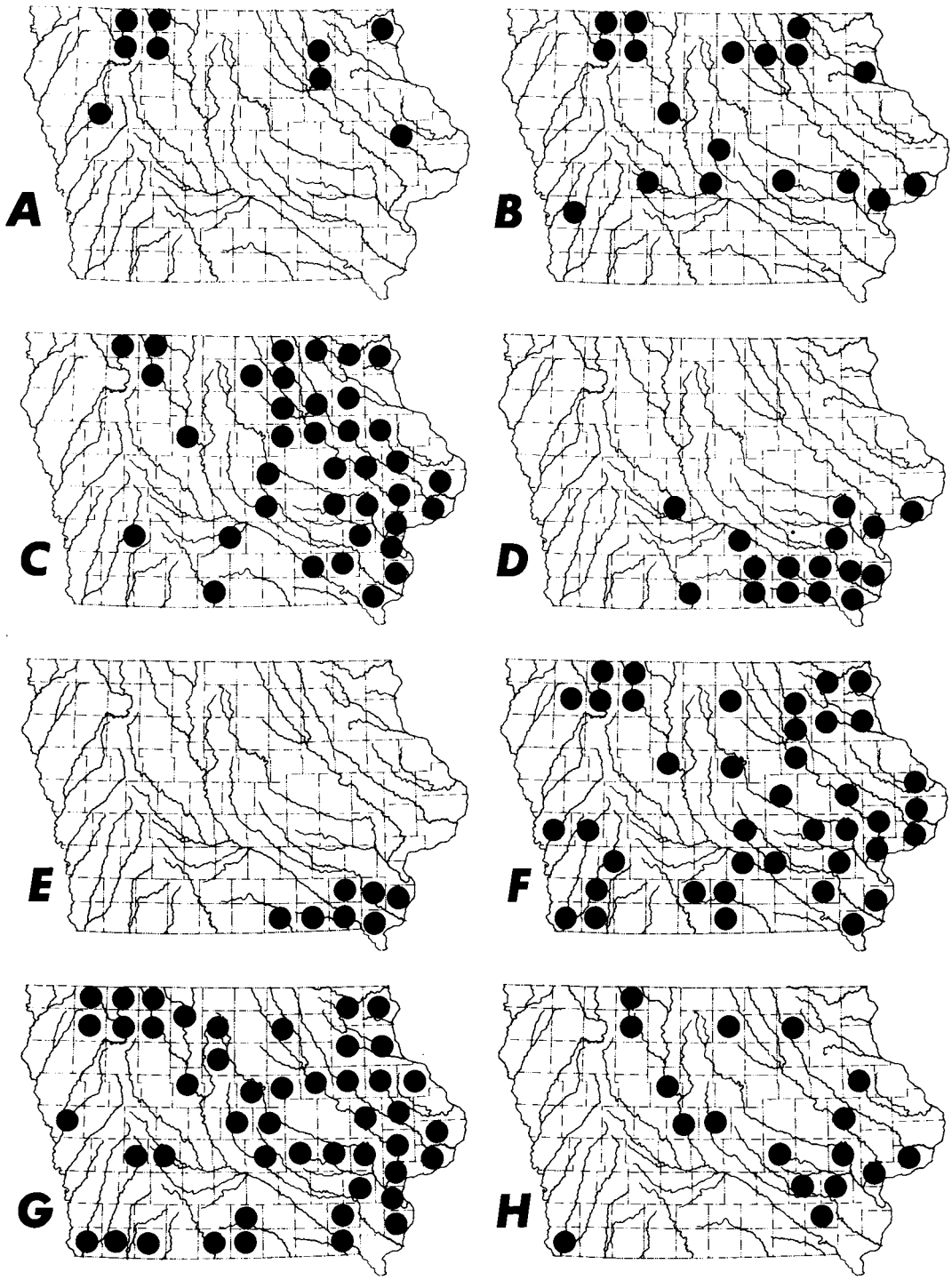

Plate 10. (A) *Carex rostrata*, (B) *Carex sartiwellii*, (C) *Carex scoparia*, (D) *Carex shortiana*, (E) *Carex squarrosa*, (F) *Carex stipata*, (G) *Carex stricta*, and (H) *Carex suberecta*.

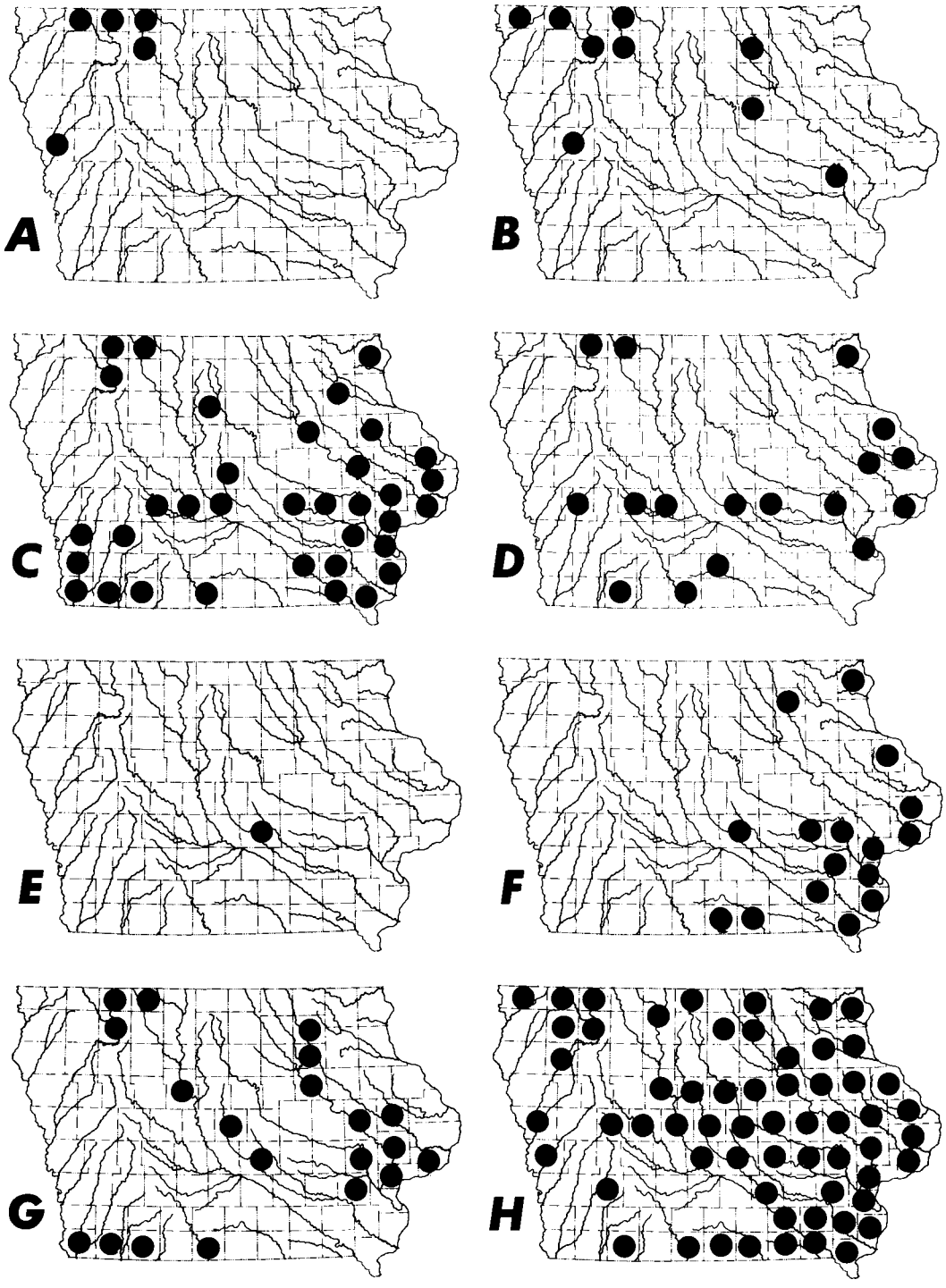

Plate 11. (A) *Carex synchocephala*, (B) *Carex tetanica*, (C) *Carex tribuloides*, (D) *Carex trichocarpa*, (E) *Carex tuckermani*, (F) *Carex typhina*, (G) *Carex versicaria*, and (H) *Carex vulpinoidea*.

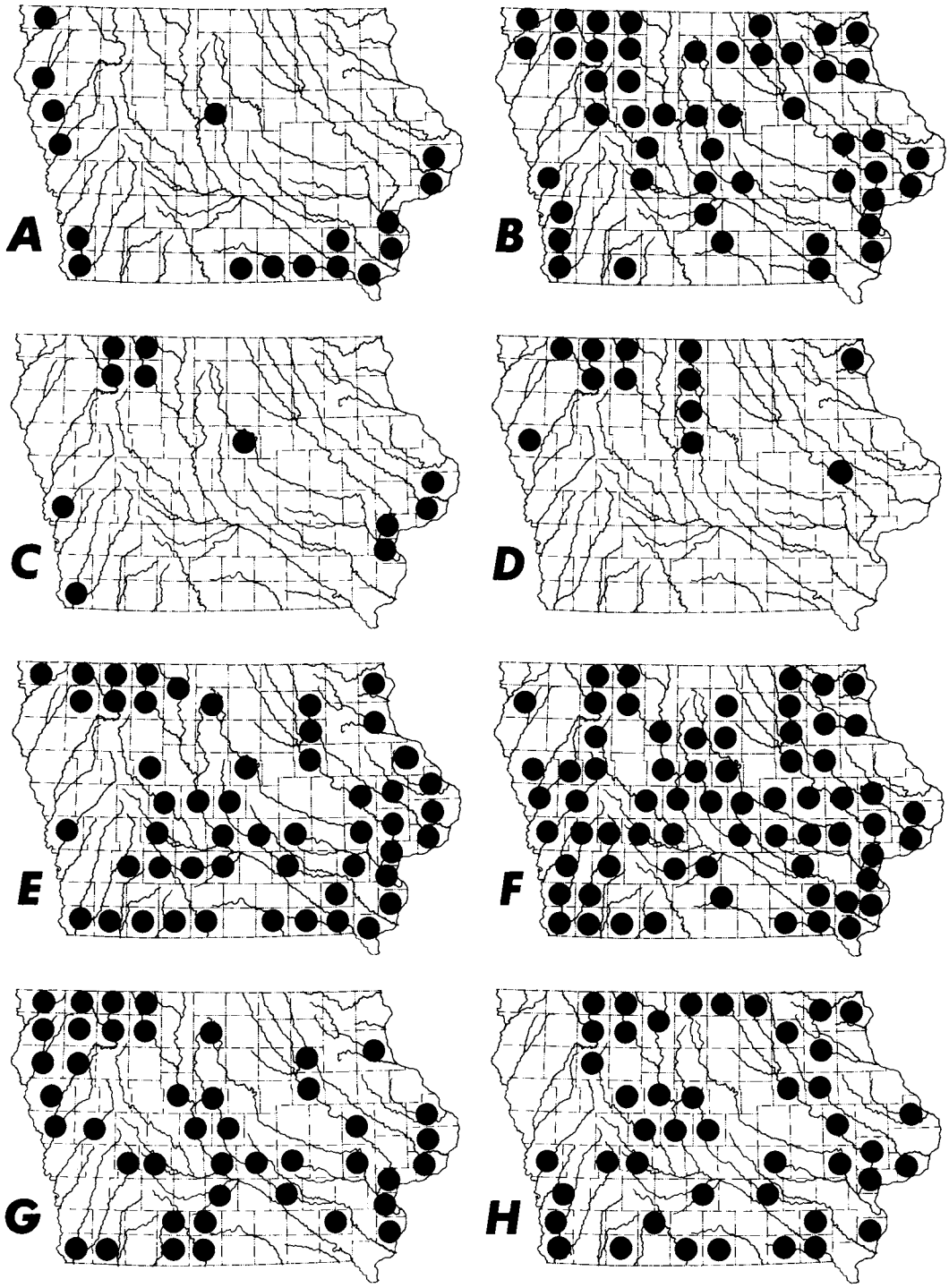

Plate 12. (A) *Cyperus acuminatus*, (B) *Cyperus aristatus*, (C) *Cyperus diandrus*, (D) *Cyperus engelmanni*, (E) *Cyperus erythrorhizos*, (F) *Cyperus esculentus*, (G) *Cyperus odoratus* var. *squarrosus*, and (H) *Cyperus rivularis*.

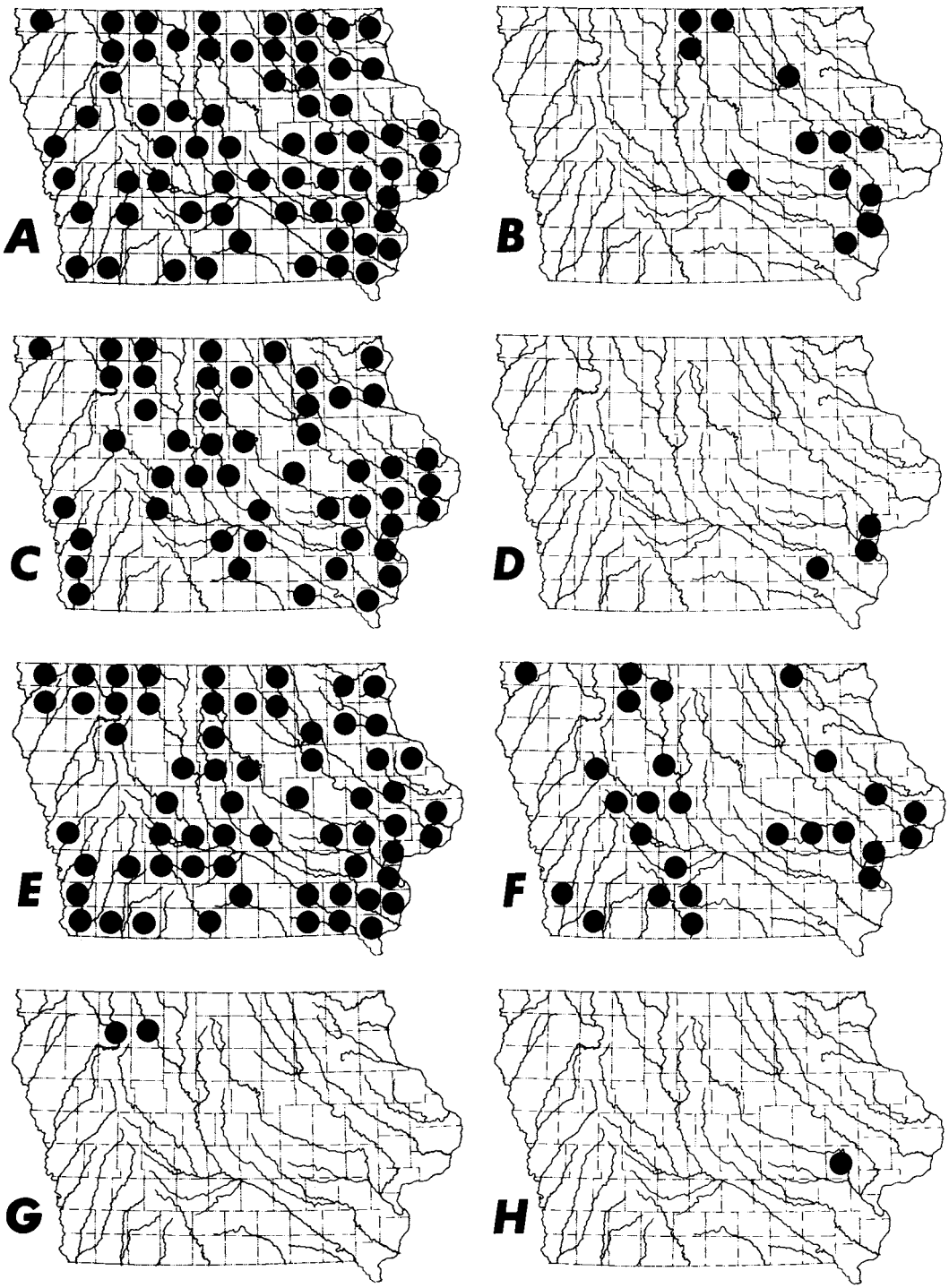

Plate 13. (A) *Cyperus strigosus*, (B) *Dulichium arundinaceum*, (C) *Eleocharis acicularis*, (D) *Eleocharis atropurpurea*, (E) *Eleocharis clava*, (F) *Eleocharis compressa*, (G) *Eleocharis coloradoensis*, and (H) *Eleocharis flavescens* var. *olivacea*.

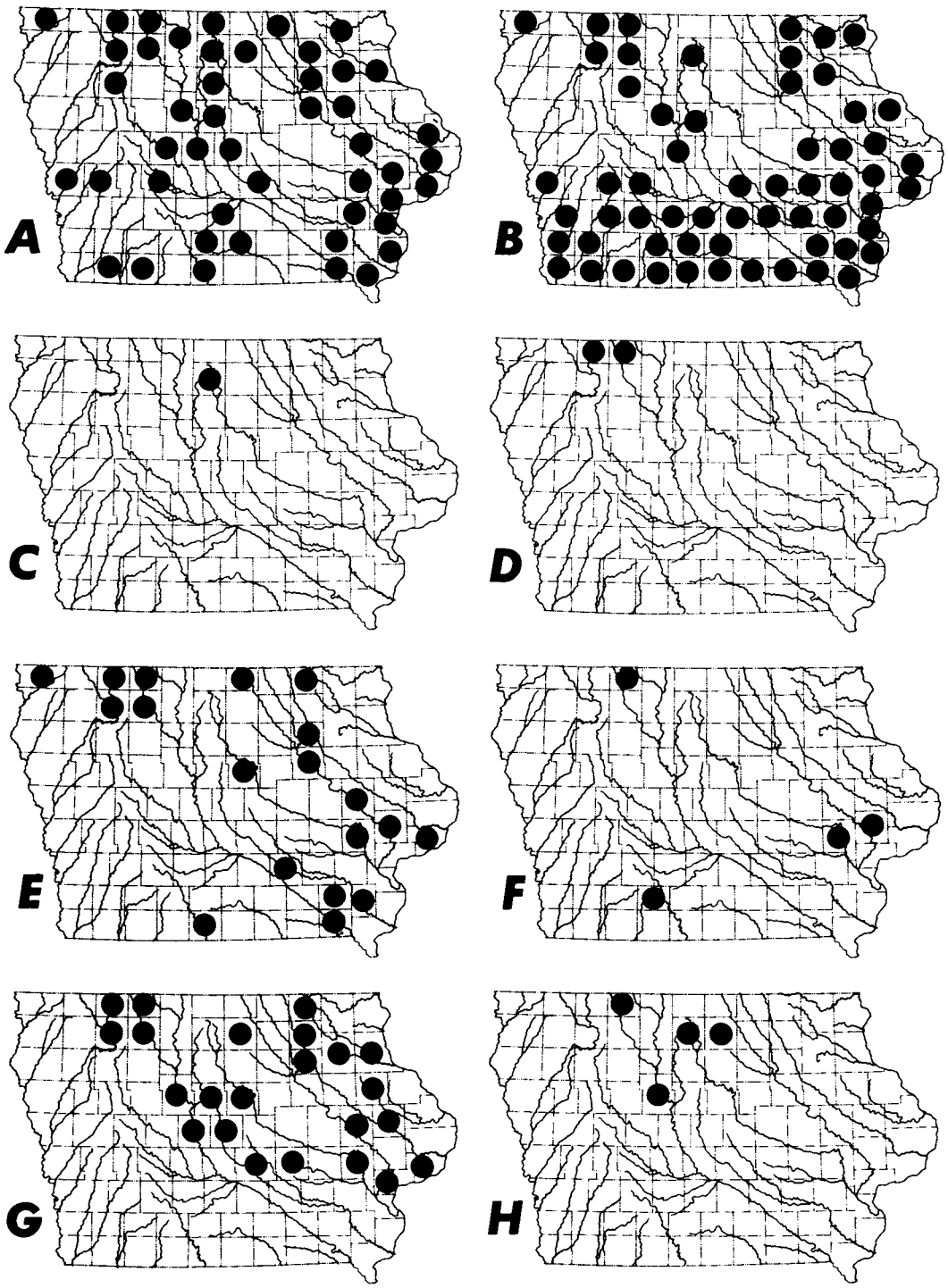

Plate 14. (A) *Eleocharis macrostachya*, (B) *Eleocharis obtusa*, (C) Eleocharis ovata, (D) *Eleocharis pauciflora*, (E) *Eleocharis tenuis*, (F) *Eleocharis wolfii*, (G) *Eriophorum angustifolium*, and (H) *Eriophorum gracile*.

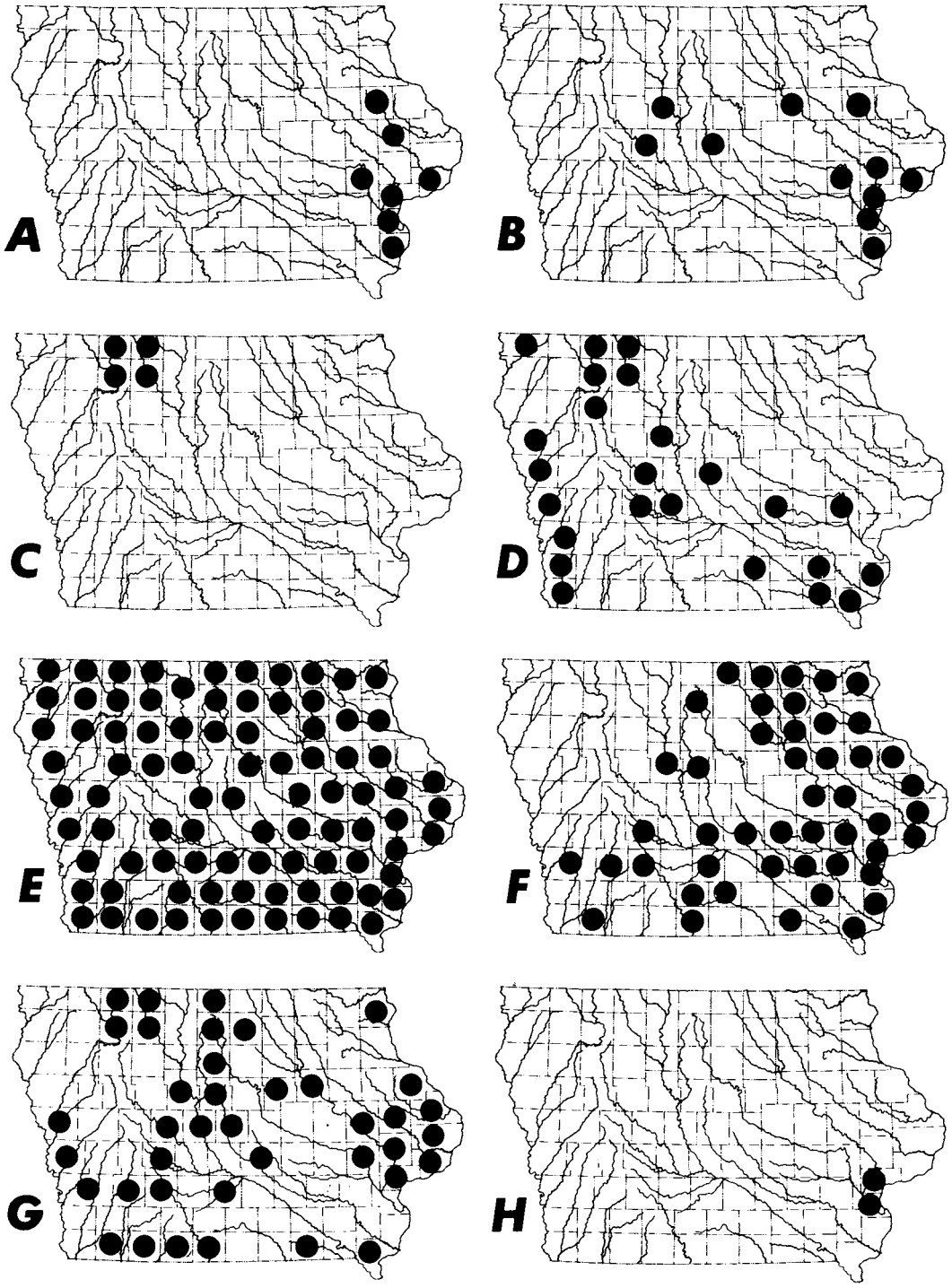

Plate 15. (A) *Fimbristylis autumnalis*, (B) *Hemicarpha micrantha*, (C) *Rhynchospora capillacea*, (D) *Scirpus americanus*, (E) *Scirpus atrovirens*, (F) *Scirpus cyperinus*, (G) *Scirpus fluviatilis*, and (H) *Scirpus hallii*.

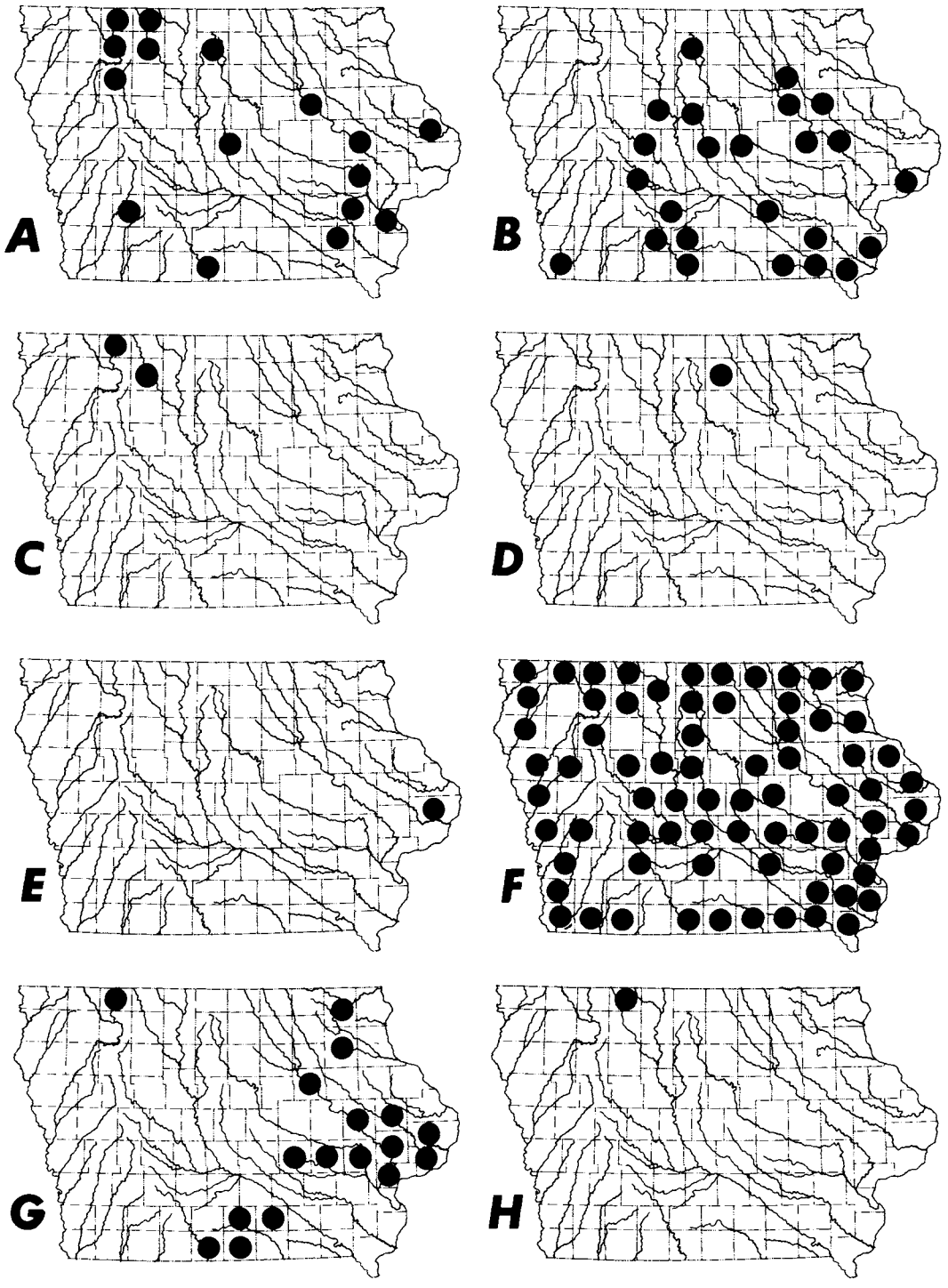

Plate 16. (A) *Scirpus heterochaetus*, (B) *Scirpus lineatus*, (C) *Scirpus paludosus*, (D) *Scirpus smithii*, (E) *Scirpus torreyi*, (F) *Scirpus validus*, (G) *Scleria triglomerata*, and (H) *Scleria verticillata*.

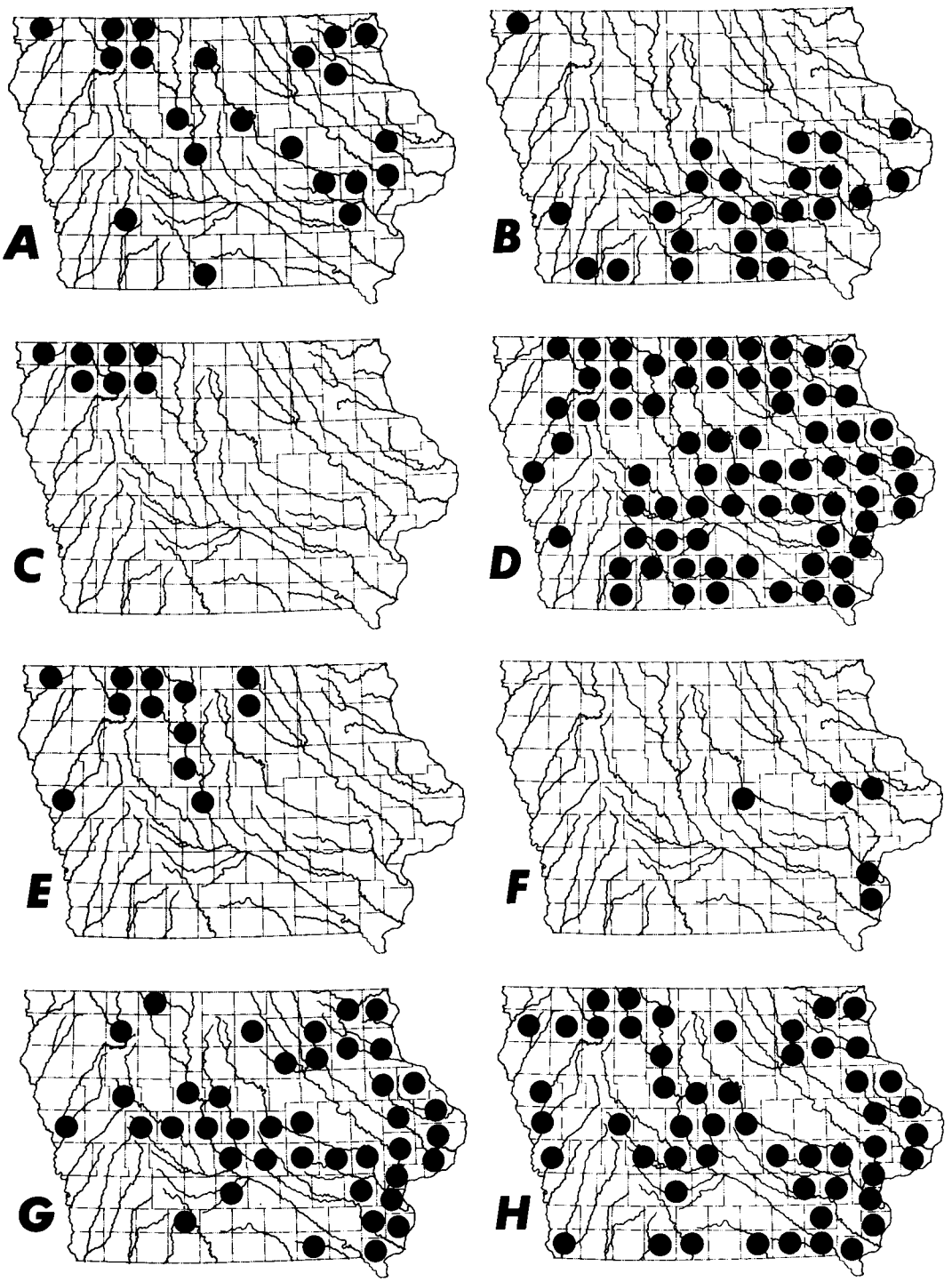

Plate 17. (A) *Alopecurus aequalis*, (B) *Alopecurus carolinianus*, (C) *Beckmannia syzigachne*, (D) *Calamagrostis canadensis*, (E) *Calamagrostis inexpansa*, (F) *Echinochloa walteri*, (G) *Eragrostis frankii*, and (H) *Eragrostis hypnoides*.

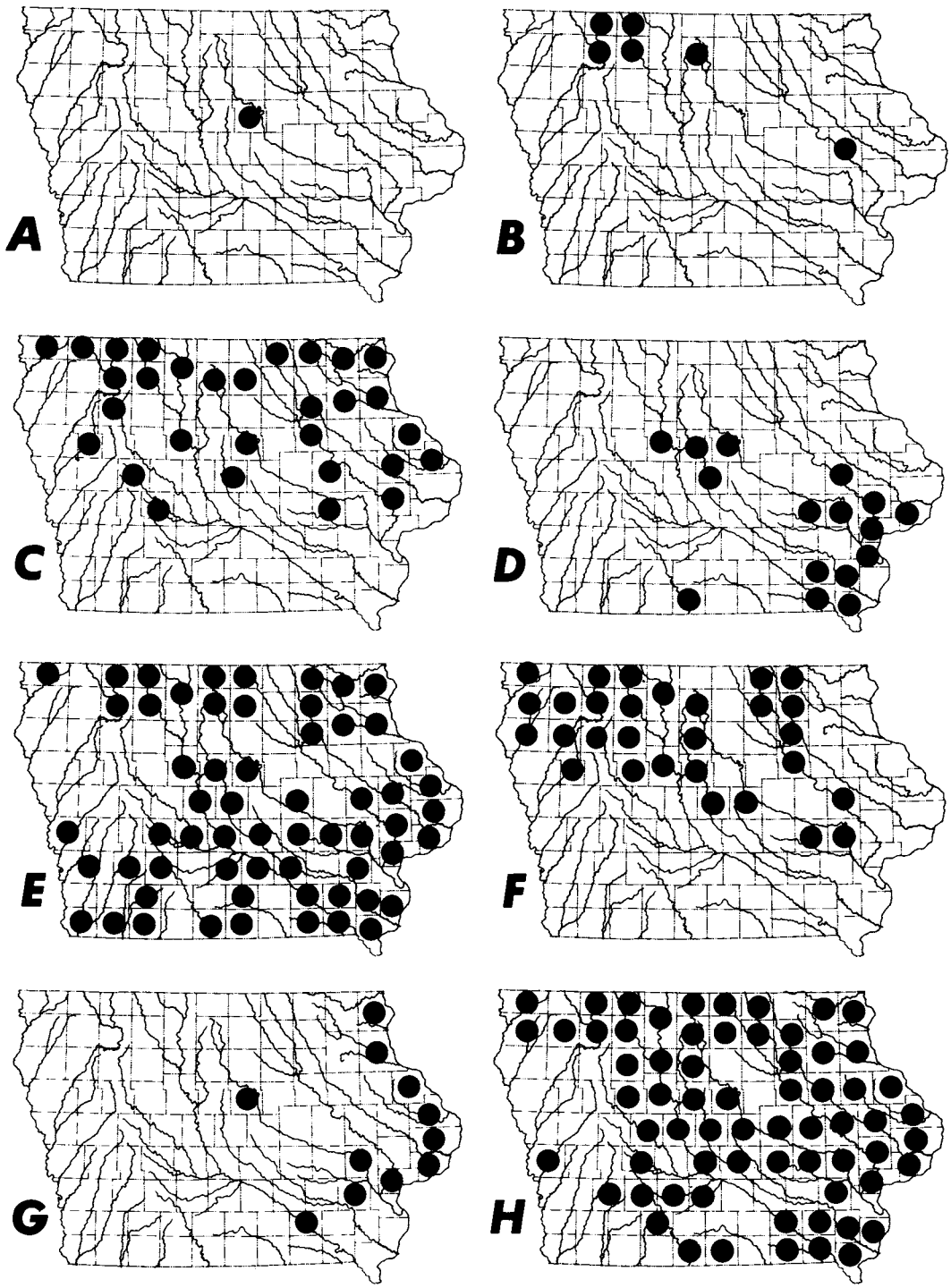

Plate 18. (A) *Eragrostis reptans*, (B) *Glyceria borealis*, (C) *Glyceria grandis*, (D) *Glyceria septentrionalis*, (E) *Glyceria striata*, (F) *Hierochloe odorata*, (G) *Leersia lenticularis*, and (H) *Leersia oryzoides*.

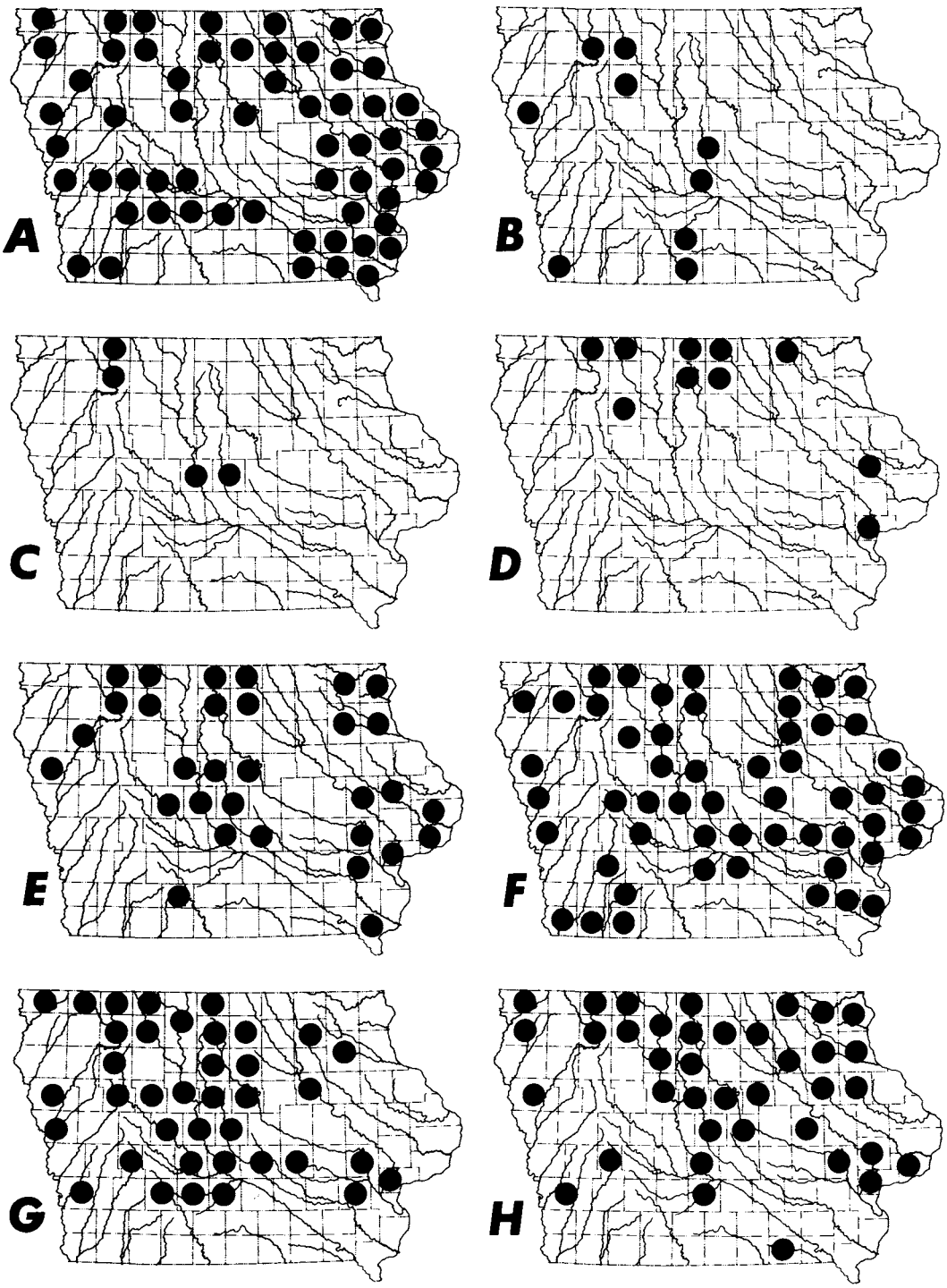

Plate 19. (A) *Leersia virginica*, (B) *Leptochloa fascicularis*, (C) *Muhlenbergia asperifolia*, (D) *Muhlenbergia glomerata*, (E) *Muhlenbergia mexicana*, (F) *Phalaris arundinacea*, (G) *Phragmites communis*, and (H) *Poa palustris*.

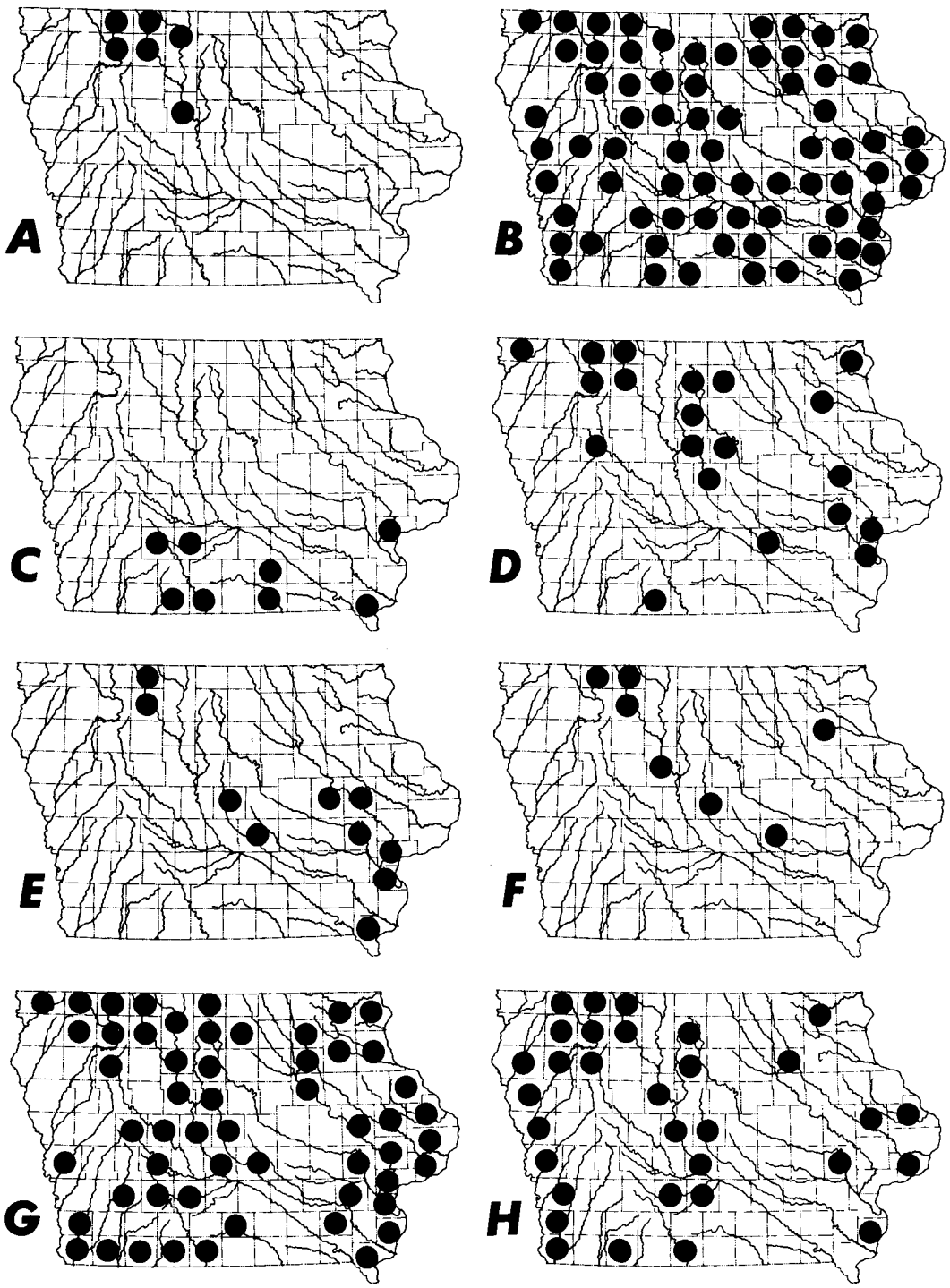

Plate 20. (A) *Scolochloa festucacea*, (B) *Spartina pectinata*, (C) *Tripsacum dactyloides*, (D) *Zizania aquatica*, (E) *Sparganium americanum*, (F) *Sparganium chlorocarpum*, (G) *Sparganium eurycarpum*, and (H) *Typha angustifolia*.

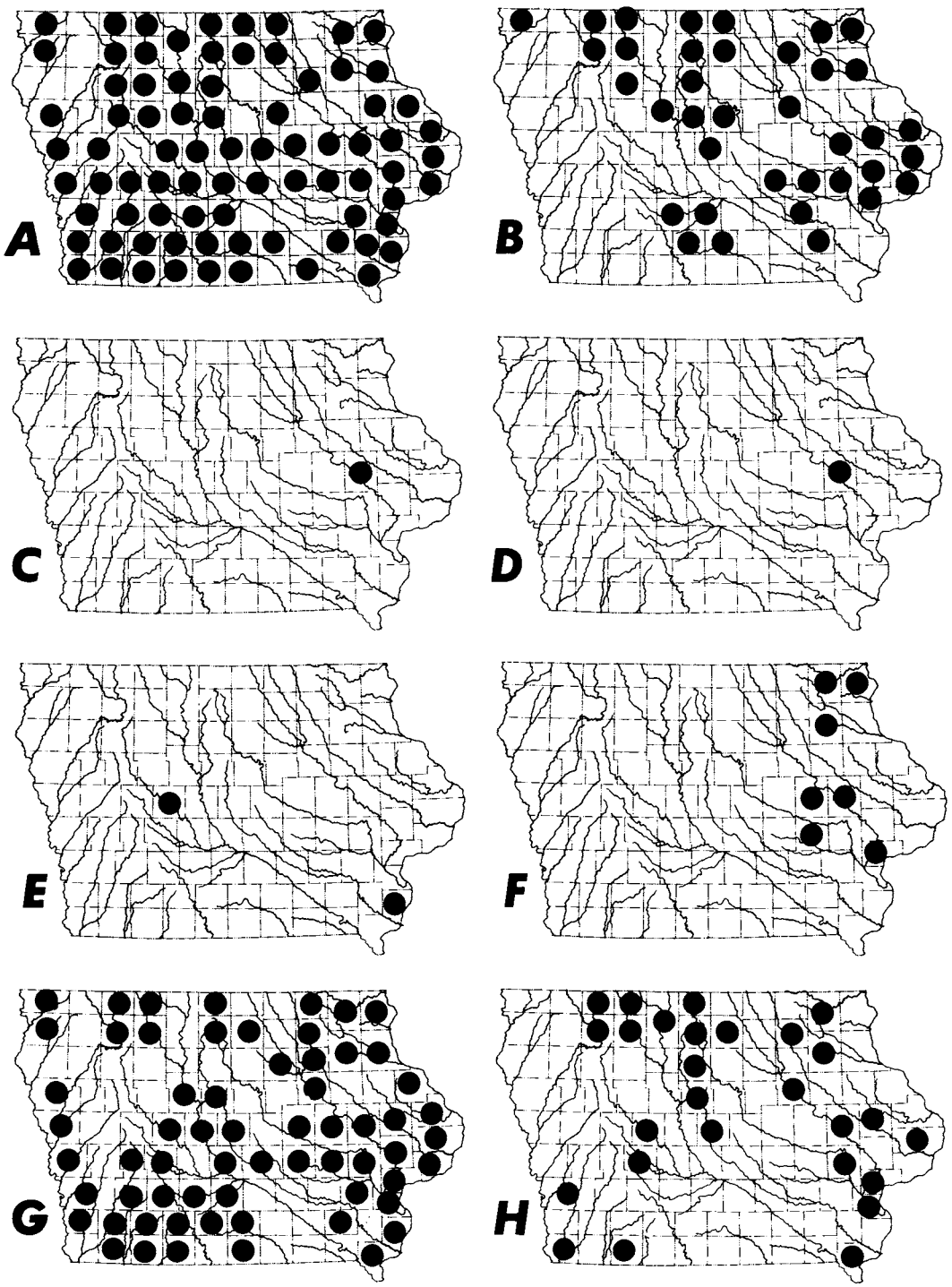

Plate 21. (A) *Typha latifolia*, (B) *Acorus calamus*, (C) *Calla palustris*, (D) *Orontium aquaticum*, (E) *Peltandra virginica*, (F) *Symplocarpus foetidus*, (G) *Lemna minor*, and (H) *Lemna trisulca*.

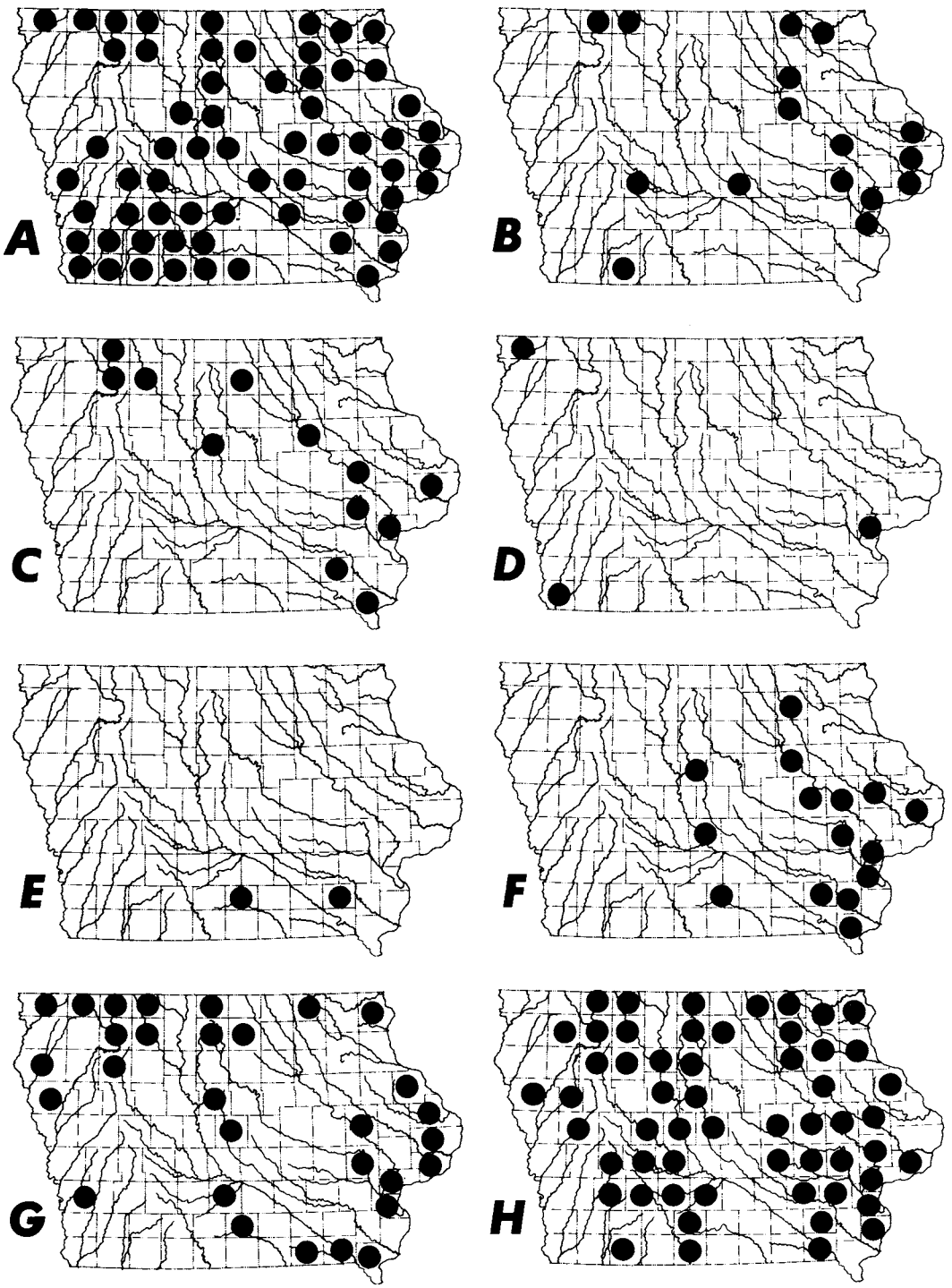

Plate 22. (A) *Spirodela polyrhiza*, (B) *Wolffia columbiana*, (C) *Wolffia punctata*, (D) *Heteranthera limosa*, (E) *Heteranthera reniformis*, (F) *Pontederia cordata*, (G) *Zosterella dubia*, and (H) *Lilium canadense*.

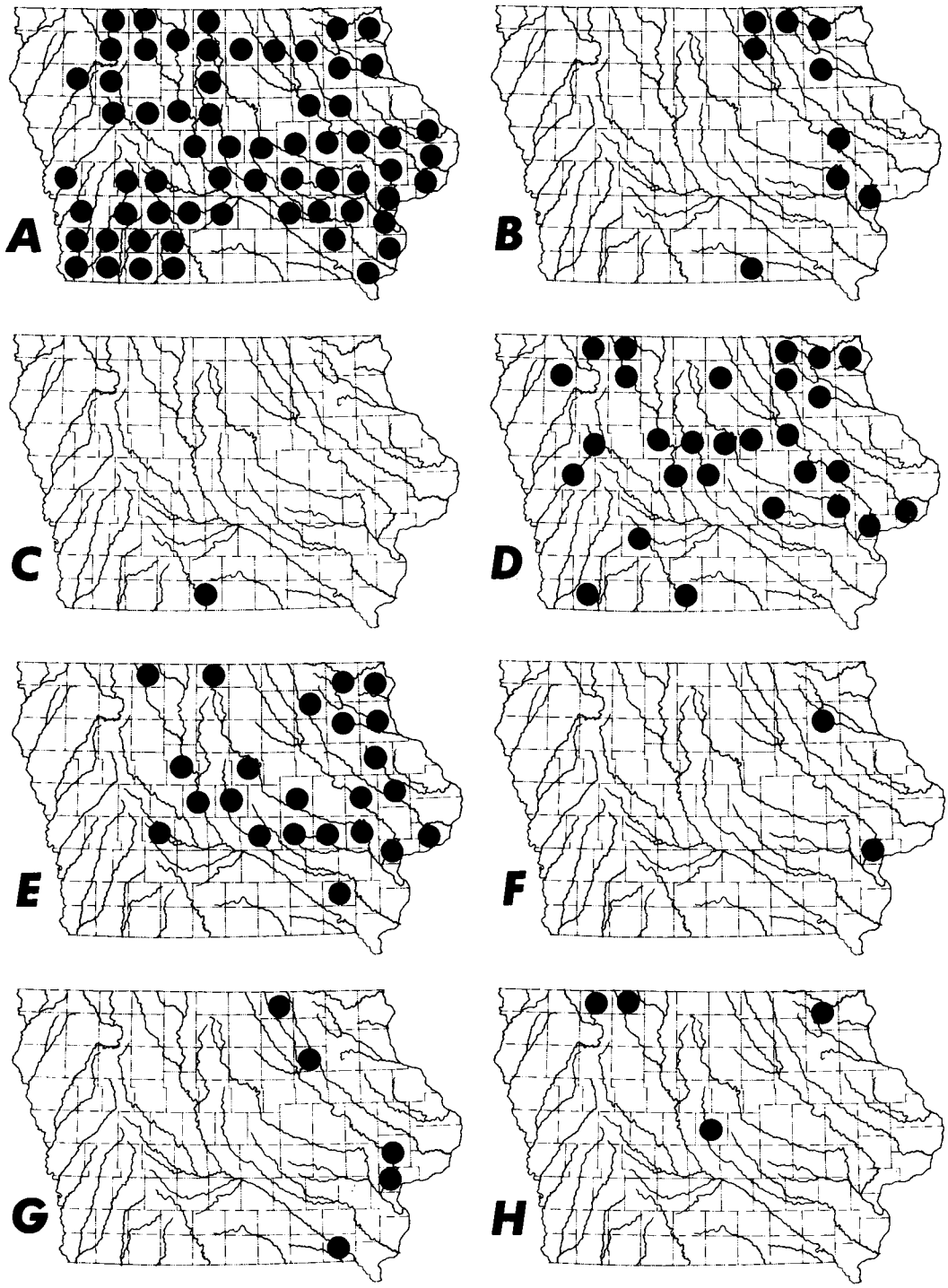

Plate 23. (A) *Iris virginica*, (B) *Calopogon pulchellus*, (C) *Cypripedium* x *andrewsii*, (D) *Cypripedium candidum*, (E) *Cypripedium reginae*, (F) *Habenaria clavellata*, (G) *Habenaria flava*, and (H) *Habenaria hyperborea* var. *huronensis*.

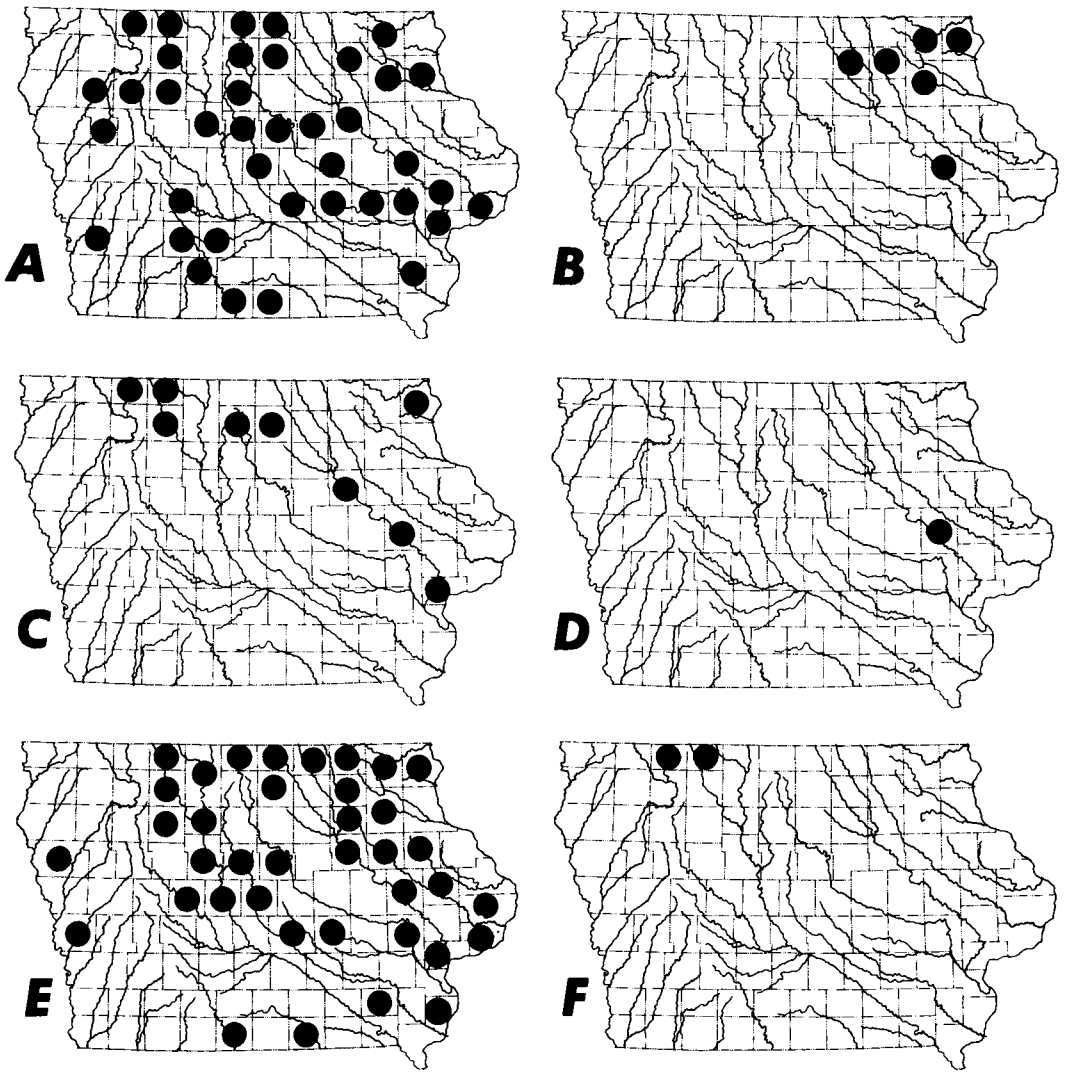

Plate 24. (A) *Habenaria leucophaea*, (B) *Habenaria psychodes*, (C) *Liparis loeselii*, (D) *Pogonia ophioglossoidea*, (E) *Spiranthes cernua*, and (F) *Spiranthes romanzoffiana*.