BETULACEAE BIRCH FAMILY

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Trees and shrubs, monoecious, often with smooth bark and lenticels. LEAVES deciduous, alternate, simple, serrate to doubly serrate, sometimes lobed, pinnately veined, often resinous abaxially; stipules early deciduous. INFLORESCENCES catkins, conspicuously bracteate in ours, often appearing before the leaves; staminate catkins pendulous or spreading, comprised of many flowers grouped in 1-3-flowered clusters; pistillate catkins erect to pendulous. FLOWERS reduced; perianth absent or minute scales at base of style; staminate flowers with (1-)4-6 stamens, a pistillode sometimes present; pistillate flowers with 1 pistil, 2-3 carpels, and 2 styles, the ovary inferior; staminodes usually absent. FRUITS nuts, nutlets, or 2-winged samaras, 1-seeded, sometimes subtended or enveloped by a foliaceous involucre. $x = 7, 8$. —6 genera, ca. 125 spp., chiefly boreal and temperate zones of n hemisphere. Economic products are timber, nuts, and ornamentals. The pollen can be allergenic.

1. Fruiting catkins white to tan clusters of inflated bracts, each bract enveloping a hard-shelled ovoid nutlet ..... ***Ostrya***

1' Fruiting catkins brown, cone-like, each bract scale-like, subtending a flat, leathery samara.
   2. Fruiting catkin bracts woody, 5-lobed, persistent long after samaras are released; pistillate catkins 1-several in racemose clusters; winter buds stipitate with 3 scales; filaments and anthers undivided ..... ***Alnus***
   2' Fruiting catkin bracts submembranous to leathery, (1-)3-lobed, usually deciduous with the samaras; pistillate catkins mostly solitary; winter buds sessile with several scales; filaments divided below the anthers, the 2 anther sacs separate ..... ***Betula***

Alnus Mill. Alder

Trees or shrubs to 35 m tall; stems often bearing lenticels; twigs 2-ranked or diffuse, uniform or differentiated into long and short shoots; winter buds stipitate, bearing 2-3 stipular scales. LEAVES on long or short shoots, 3-ranked to nearly 2-ranked; blades ovate to elliptic or obovate; margins serrate, doubly serrate, or sub-entire; surfaces glabrous to tomentose, sometimes resinous-glandular abaxially. INFLORESCENCES in ours formed the previous growing season and exposed during winter; catkins 1-several in racemose clusters; pistillate catkins erect or pendulous, in age becoming cone-like with thick, woody, 5-lobed scales that persist long after fruits fall. STAMINATE FLOWERS 3 per scale, each with (1-)2-4(-6) stamens. PISTILLATE FLOWERS usually 2 per scale. FRUITS tiny leathery samaras; lateral wings 2, sometimes reduced or essentially absent. $x = 7$. –Ca. 25 spp.; mostly n hemisphere (Latin: *alnus* = alder). Furlow, J. J. 1979. *Rhodora* 81:1-121, 151-248. All alders harbor species of the nitrogen-fixing actinomycete genus *Frankia* in root nodules.

1. Leaf base rounded, truncate, or subcordate; leaf margins doubly serrate, the major teeth acute or obtuse to rounded in outline; stamens 4; basal fruiting catkins of a cluster on peduncles 0-4 mm long; large shrubs or small shrubby trees to 9 m tall; bark reddish-brown on older trunks; mostly above 2150 m (7000 ft) ..... ***A. incana***

Vascular Plants of Arizona: Betulaceae. JOURNAL OF ARIZONA-NEVADA ACADEMY OF SCIENCE 33(1):1-8, 2001.

1' Leaf base acutish to short-cuneate; leaf margins singly to doubly serrate, if doubly serrate the major teeth acuminate in outline; stamens (1-)2(-4); basal fruiting catkins of a cluster on peduncles (0-)5-10 mm long; trees to 30 m tall; bark grayish-brown on older trunks; mostly below 2300 m (7500 ft) ..... ***A. oblongifolia***

Alnus incana (L.) Moench (hoary, white). —Large shrubs or small shrubby trees to 9 m tall; bark of older trunks reddish-brown; winter buds rounded to nearly acute apically, the scales 2-3. LEAVES: blades elliptic or ovate-oblong (rarely ovate), 4-8 cm long, 3-5 cm wide, the bases rounded, truncate, or subcordate; margins doubly serrate, the major teeth acute to obtuse or rounded in outline, each comprised of several smaller teeth. INFLORESCENCES catkins in clusters of 2-5, with 1 or more clusters on a branchlet; basal fruiting catkins of a cluster on peduncles 0-4 mm long; individual fruiting catkins spheroid to nearly cylindric, 0.7-2 cm long, 0.7-1.2 cm wide. STAMINATE FLOWERS each with 4 stamens. SAMARAS elliptic to obovate, the wings narrower than the body, irregular in shape. $2n = 28$. —4 subsp., 1 in AZ; U.S., Can.

Subsp. **tenuifolia** (Nutt.) Breitung (thin-leaf) Thin-leaf Alder. —Lenticels pale, orbicular to linear, on stems of all sizes; winter buds 4-7 mm long, on stalks 1-3 mm long; scales 2. LEAVES: blade thin and papery; surfaces abaxially glabrous to sparsely pubescent, slightly to imperceptibly resin-coated. [*A. tenuifolia* Nutt., *A. incana* (L.) Moench subsp. *rugosa* (Du Roi) R. T. Clausen var. *occidentalis* (Dippel) C. L. Hitchc.]. —In mountains usually along streams or in other wet places: Apache, Coconino, Gila, Graham, Greenlee, Navajo, Pima, Yavapai cos.; 1900-3000 m (6300-9000 ft); early spring; w U.S.; w Can. Used medicinally by Native Americans for various afflictions.

Alnus oblongifolia Torr. (oblong leaves). Arizona Alder, New Mexican Alder. —Trees to 30 m tall, the trunks often several; bark of older trunks grayish-brown; winter buds rounded apically, the scales 2. LEAVES: blades ovate or oblong-ovate to lanceolate, 3-9(-12) cm long, 1.5-6(-7) cm wide, the bases acutish to short-cuneate; margins doubly serrate with major teeth sharp, acuminate, these sometimes scarcely distinguishable among minor teeth. INFLORESCENCES catkins in clusters of 2-7, with 1 or more clusters on a branchlet; basal fruiting catkins on peduncles (0-)5-10 mm long; individual fruiting catkins spheroid to nearly cylindric, 1-2.5 cm long, 0.7-1.5 cm wide. STAMINATE FLOWERS each with (1-)2(-4) stamens. SAMARAS elliptic to obovate, the wings narrower than the body, irregular in shape. —In mountain canyons along streams and on moist slopes: all cos. except Cochise, La Paz, Santa Cruz, Yuma; 650-1950 m (2100-7500 ft); early spring; NM; Son., Chih., Mex.

Betula L. Birch

Trees or shrubs to 30 m tall; trunks often several; twigs nearly 2-ranked, differentiated into long and short shoots; winter buds sessile, with several imbricate scales; bark of trunks and branches dark brown or reddish to white, often exfoliating; lenticels conspicuous. LEAVES mostly on short shoots, nearly 2-ranked; blades ovate to deltoid, elliptic, or nearly orbiculate; margins serrate, doubly serrate, or crenate; surfaces glabrous to tomentose, sometimes abaxially resinous. INFLORESCENCES: staminate catkins solitary or in racemose clusters, formed the previous growing season, expanding with the leaves; pistillate catkins mostly solitary, proximal to staminate catkins, erect or sometimes becoming pendulous in fruit, the scales and flowers crowded and enclosed within the buds during winter, deciduous in fruit. STAMINATE FLOWERS 3 per scale; stamens (1-)2-3(-4), the filaments divided below the anthers, the 2 anther sacs separate. PISTILLATE FLOWERS 1-3 per scale. FRUITS tiny leathery samaras; wings 2, lateral, membranaceous. $x = 14$. —Ca. 50 spp.; circumboreal. (Latin *betula* = birch). Species of *Betula* yield important wildlife food, wood for interior finishing, and popular ornamentals.

Betula occidentalis Hook. (western). Water Birch. —Small trees or large shrubs to ca. 6 m tall in ours, with several trunks, occasionally to 25 cm or more in diameter; bark dark reddish brown to bronze, smooth, not or scarcely exfoliating, with conspicuous lenticels; twigs glabrous or sparsely pubescent, bearing conspicuous, yellowish to reddish resinous crystalline glands. LEAVES: blades broadly ovate to rhombic to suborbicular, 2-5.8 cm long, 1-4.5 cm wide, the bases truncate to rounded or cuneate, the margins (except the basal portions) sharply and often doubly serrate, the apices acute to occasionally short-acuminate, the surfaces resinous, glabrous to sparsely pubescent. INFLORESCENCES: fruiting catkins erect to nearly pendulous, cylindric, 10-40 mm long, 4-10 mm thick, shattering in autumn; scales puberulent and ciliate, the central lobe longest. SAMARAS with wings broader than body. $2n = 28$. [*B. fontinalis* Sarg.] —Mountain streams, seeps, and springs, often forming thickets: Apache, Coconino, Navajo, Yavapai cos.; 1050-2450 m (3400-8000 ft); late spring; AK to Hudson Bay s into NM, AZ, CA.

Ostrya Scop. Hop-hornbeam

Trees to 18 m tall; trunks usually 1 (often several in ours); wood very hard and heavy; bark brownish gray to light brown, breaking into shaggy vertical strips and scales; lenticels generally inconspicuous; twigs conspicuously 2-ranked, differentiated into long and short shoots; winter buds sessile, longitudinally striate, with many imbricate scales. LEAVES on long and short shoots, 2-ranked; blades ovate to obovate with 10 or more pairs of lateral veins; margins doubly serrate to serrulate; surfaces abaxially glabrous to tomentose. INFLORESCENCES: staminate catkins pendulous, mostly in small racemose clusters, visible the previous growing season; pistillate catkins terminal on short shoots, pendulous, produced in the current season; fruiting catkins white or tan strobiloid clusters of inflated bracts, each bract dispersed with the enclosed fruit. STAMINATE FLOWERS 3 per bract; stamens 3-6, the filaments divided, each part bearing an apically pilose anther sac. PISTILLATE FLOWERS 2 per bract. FRUITS small, ovoid nutlets. $x = 8$. —5 spp.; mostly n temperate zones. (Greek *ostryos* = scale - referring to scaly catkins).

Ostrya knowltonii Coville (for F. H. Knowlton). Knowlton's Hop-hornbeam. —Usually large shrubs or small trees to 9 m tall, the trunks often several; bark grayish-tan; twigs moderately pubescent, becoming glabrous; hairs spreading, white; glands brown, long-stipitate to sessile. LEAVES: blades ovate-lanceolate (occasionally suborbicular or obovate), 0.7-6.0(-8.2) cm long, 0.7-5.2 cm wide, the bases rounded to obtuse and often slightly oblique, the apices usually acute to rounded, the margins sharply and irregularly doubly serrate; surfaces sparsely pubescent especially on the veins. INFLORESCENCES: staminate catkins 1.5-3 cm long; pistillate catkins 0.7-1 cm long, in fruit to 4.5 cm long and about as wide, changing from green to white to tan, the bracts inflated, hop-like, 1-1.8 cm long, 0.5-1 cm wide. NUTLETS ca. 6 mm long and 2 mm wide. —In moist canyons, usually near water: Grand Canyon and w fork of Oak Creek Canyon, Coconino co.; 1400-2150 m (4600-7000 ft.); late spring; NM, TX, UT.

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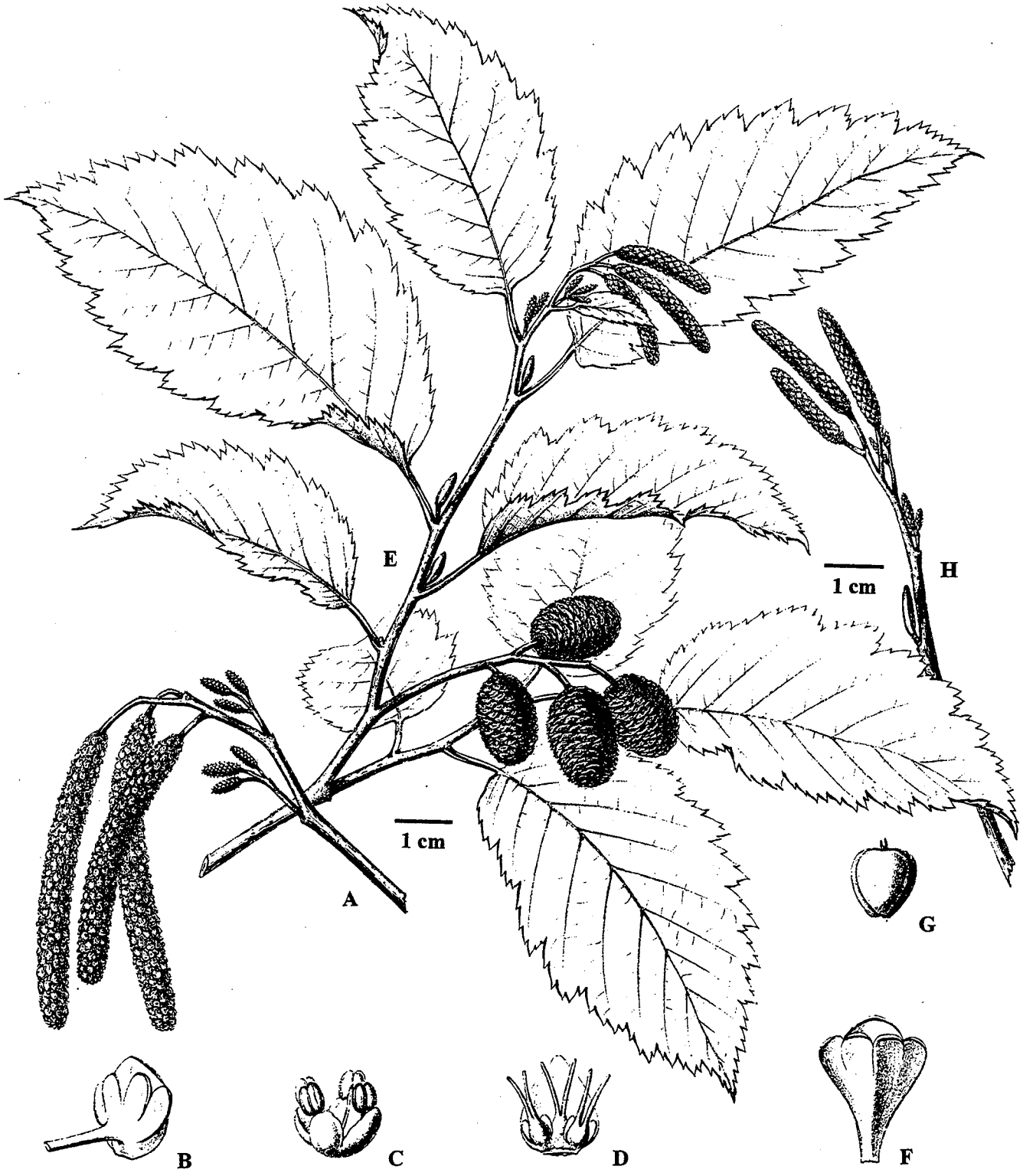
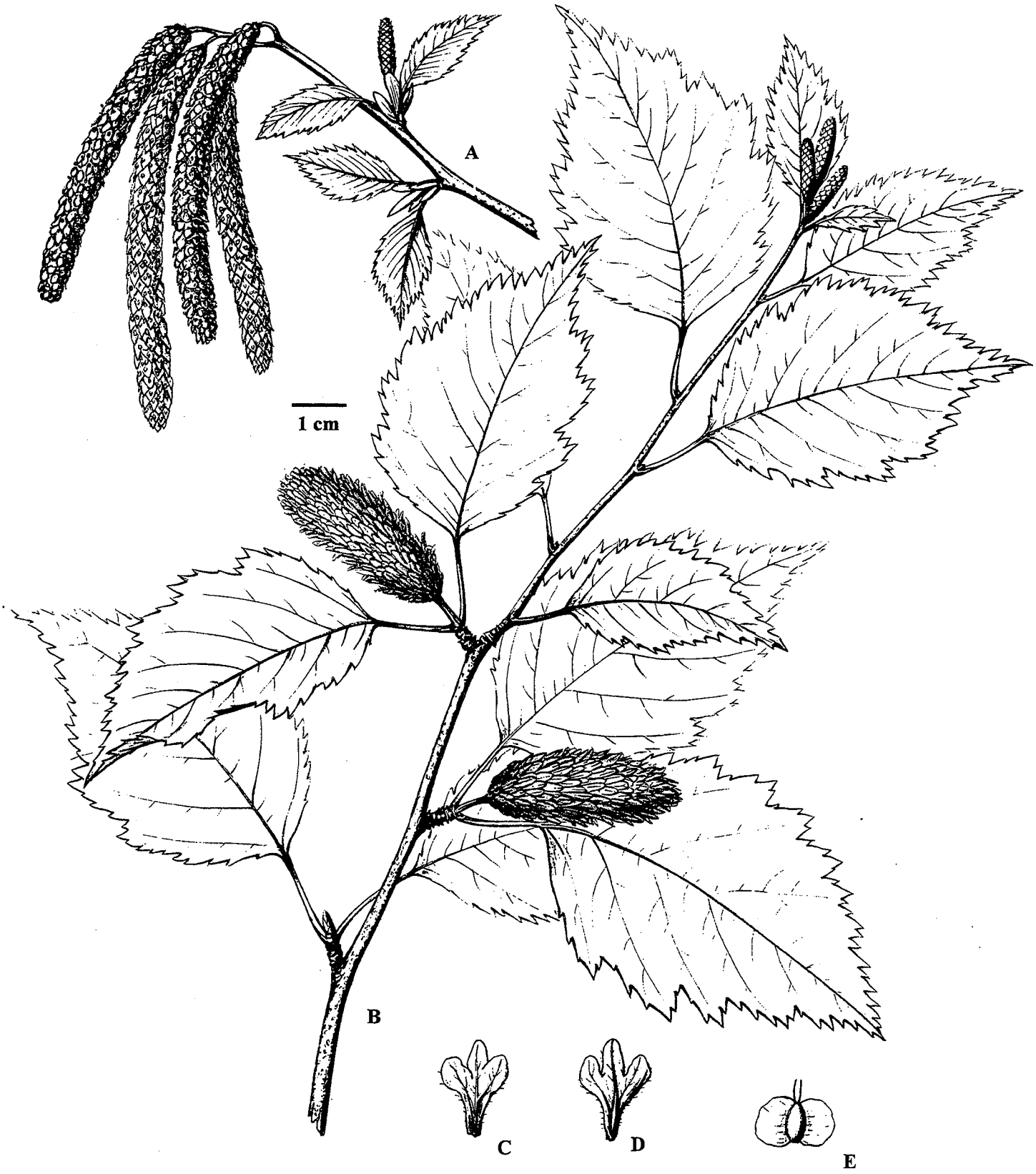
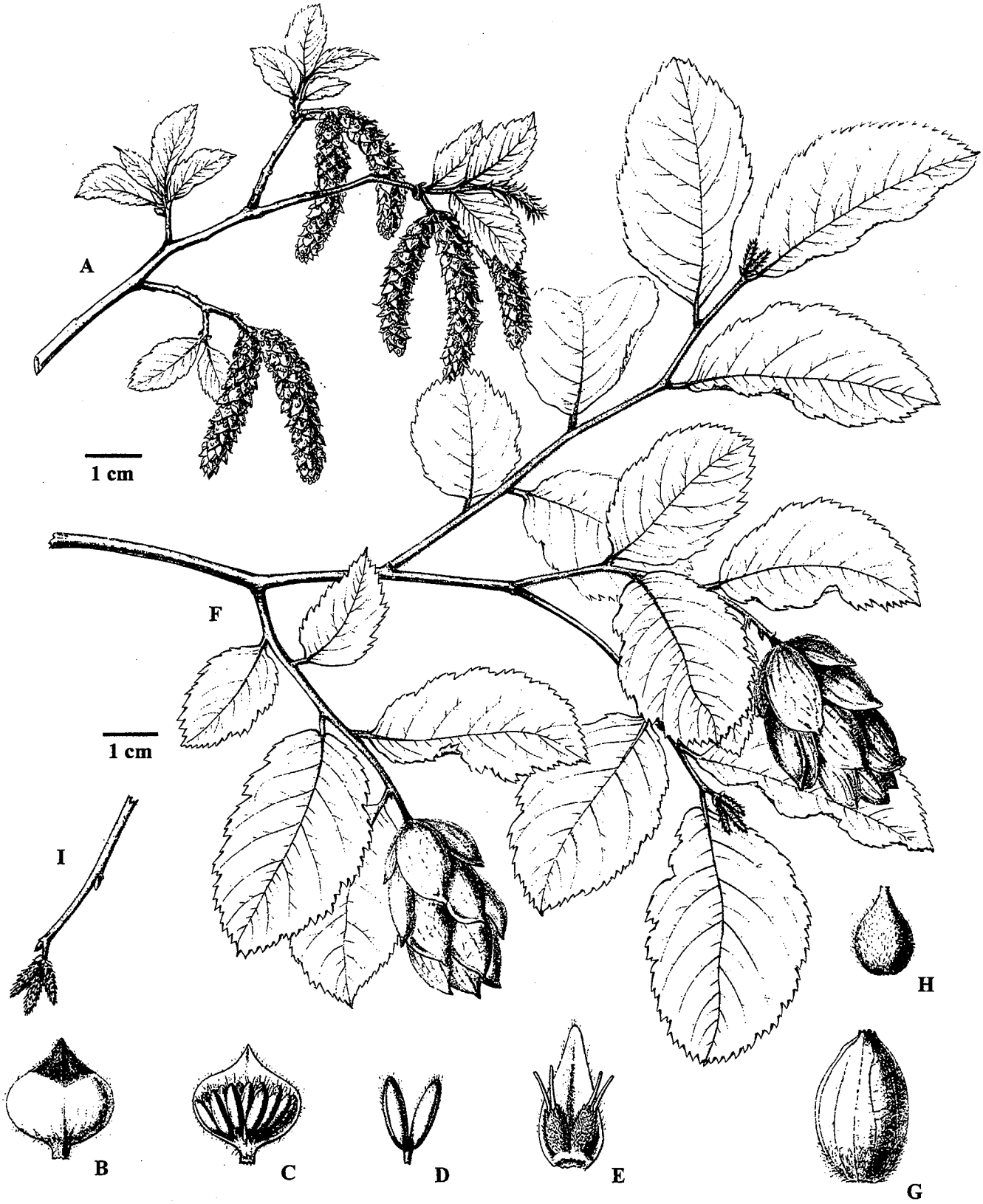


Betulaceae Fig. 1. *Alnus incana* subsp. *tenuifolia*. A, staminate catkins flowering in early spring; B, scale of staminate catkin; C, staminate flower; D, pistillate flowers with their scale; E, fruiting branch; F, scale of fruiting catkin; G, samara; H, winter bud and staminate catkins. From C. S. Sargent (1890-1902), *Silva of North America*.

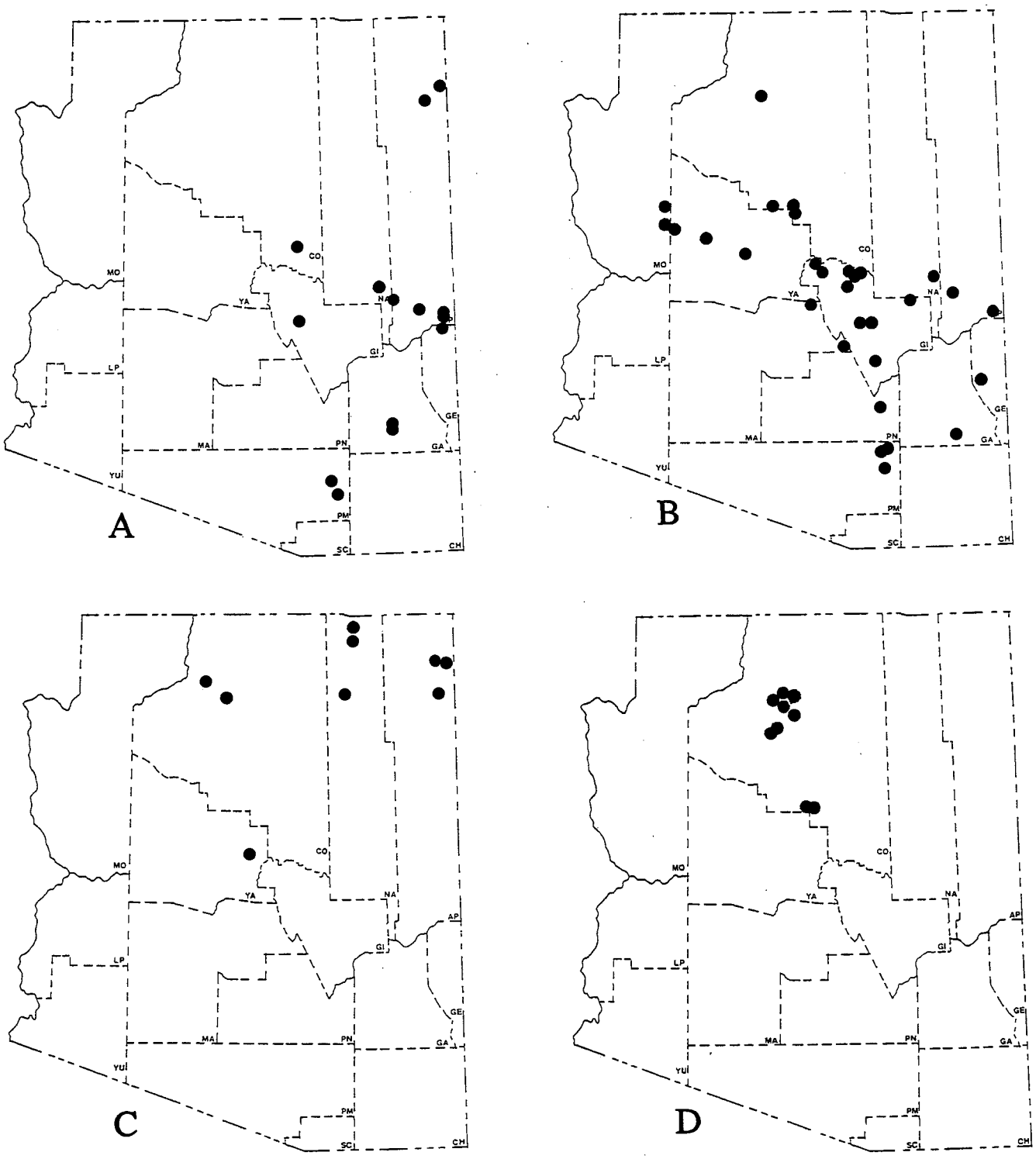
Betulaceae Fig. 2. *Alnus oblongifolia*. A, staminate catkins flowering in early spring; B, scale of staminate catkin with flowers; C, staminate flower; D, pistillate flowers with their scale; E, fruiting branch; F, scale of fruiting catkin with samaras; G, sectioned samara. From C. S. Sargent (1890-1902), *Silva of North America*.



Betulaceae Fig. 3. *Betula occidentalis*. A, staminate catkins flowering in late spring; B, fruiting branch; C-D, scales of fruiting catkin; E, samara. From C. S. Sargent (1890-1902), *Silva of North America*.



Betulaceae Fig. 4. *Ostrya knowltonii*. A, staminate catkins flowering in late spring; B, bract of staminate catkin; C, staminate flower with its bract; D, stamen; E, pistillate flowers with their bract; F, fruiting branch; G, fruiting bract; H, nutlet; I, winter branchlet with staminate catkins. From C. S. Sargent (1890-1902), *Silva of North America*.



Betulaceae Fig. 5. Distributions of: A, *Alnus incana* subsp. *tenuifolia*; B, *A. oblongifolia*; C, *Betula occidentalis*; D, *Ostrya knowltonii.*