

Proceedings of the Iowa Academy of Science

Volume 29 | Annual Issue

Article 66

1922

A Manual of the Gymnosperms ("Ever-Greens") of Iowa, Both Native and Cultivated

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Recommended Citation

Conard, Henry S. (1922) "A Manual of the Gymnosperms ("Ever-Greens") of Iowa, Both Native and Cultivated," *Proceedings of the Iowa Academy of Science*, 29(1), 328-338.
Available at: <https://scholarworks.uni.edu/pias/vol29/iss1/66>

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A MANUAL OF THE GYMNOSPERMS ("EVER-GREENS") OF IOWA, BOTH NATIVE AND CULTIVATED

HENRY S. CONARD

Series 2. PTEROPSIDA

Class 2. GYMNOSPERMAE Naked seeded Pteropsidans.
(Gymnos, naked; sperma, seed)

Trees or shrubs with needle-shaped or scalelike lvs., or with broad 2-lobed fork-veined lvs. The pollen falls directly upon the ovule or young seed; there is therefore no stigma or ovary. Wood close grained, without ducts (pores); "soft woods."

Stam. fl. conelike or catkin-like, short-lived. Seeds various, with fleshy endosperm. Cambium in stems and roots, forming rings of wood.

Note: This group includes the common "evergreens," as well as the deciduous larches, cypress and ginkgo. They are favorites for ornamental plantings and for windbreaks. There is no native species at Grinnell, and probably none nearer than Eldora. They are descendants of a vegetation that was dominant all over the earth in middle geologic time (Mesozoic). The wood of many species is of very great value. Though many of them are very hard and durable, these are all technically called "soft-woods."

Key to genera of Gymnosperms

- | | |
|---|-------------|
| 1. Deciduous (shedding lvs. in winter) | 2 |
| 1. Evergreen | 4 |
| 2. Cone-bearing; lvs. clustered | LARIX |
| 2. No cones evident | 3 |
| 3. Lvs. needle-shaped; bark black | TAXODIUM |
| 3. Lvs. broad, 2-lobed, fork-veined | GINKGO |
| 4. Lvs. in bunches of 2, 3 or 5, long, needle-shaped | PINUS |
| 4. Lvs. one in a place | 5 |
| 5. Lvs. needle-shaped, slender | 6 |
| 5. Lvs. scalelike, opposite, pressed close to stem | 10 |
| 6. Lvs. spirally arranged | 7 |
| 6. Lvs. opposite or whorled | JUNIPERUS |
| 7. Lvs. flat, with distinct upper and lower sides | 8 |
| 7. Lvs. 4-sided in cross section | PICEA |
| 8. Each leaf continued down stem in a narrow ridge | 11 |
| 8. Lvs. not extending down along stem | 9 |
| 9. Leaf scars slightly raised; buds chocolate brown, very sharp | PSEUDOTSUGA |
| 9. Leaf scars not at all raised; buds yellowish, rounded | ABIES |
| 10. Twigs 4-sided | JUNIPERUS |
| 10. Twigs flat | THUJA |
| 11. Tree; cones 1-2cm. long | TSUGA |
| 11. Sprawling shrub; no cones; seed in a red fleshy cup | TAXUS |

Order 5. GINKGOALES Ginkgo order

Trees with cream-colored bark, and conical outline. Lvs. deciduous with broadly wedge-shaped base, a deep notch at apex, and fine forked veining, borne in groups on black, knoblike short-shoots.

Stam. fl. 1-2cm. long, catkin-like, a group of stalks, each bearing 2 large pollen sacs. Pist. fl. on another tree, a slender stalk 2-3cm. long bearing 2 naked ovules at tip. Fruit a plumlike, fleshy seed, 2cm. in diameter, dull yellow; inner seed coat shell-like enclosing endosperm and a dicotyledonous embryo.

Note: In 1897 it was announced that in these plants the egg-cell is fertilized in the seed about Sept. 1 by an active swimming sperm cell, as in ferns. This fact, with the veining of the leaf and many other details of structure and development, makes this tree precisely intermediate between the ferns and the pines. Probably no plant is of greater theoretical interest and importance.

Family 4. GINKGOACEAE Ginkgo family

Characters of the order

Ginkgo Maiden-hair tree

(The Chinese name)

Characters of the order

1. G. BILOBA Two-lobed G.

The only species.

Cult., rare.

Campus; 5th Ave. and Prince St.

Native of China.

Fl. May. Fr. Oct.

Note: This is the last surviving species of a family of world-wide distribution a few million years ago. Its ancestry runs back very clearly to the coal period, being related to the Cordaitales whose long parallel-veined lvs. cover almost every slab of Iowa coal. Ginkgo may occur wild in central China. It has been cultivated for ages about temples in China and Japan. The seeds are used for food. As it does not bloom until 25-30 yrs. old, no fls. have yet been seen in Grinnell. This species is very desirable as a street and lawn tree.

Order 6. CONIFERALES Conifer order

Trees or shrubs with needle-like or scalelike lvs., opposite or alternate or clustered, mostly evergreen. Wood, bark or lvs. resinous.

Fls. monoecious or dioecious. Seeds borne on scales of a "cone" which may be fleshy and berry-like (naked in *Taxus*).

Family 5. PINACEAE Pine Family

Both pollen and ovules borne in catkin- or conelike groups, the ovules hidden at the base of young cone scales.

1. *Pinus*

Pine

(The classical latin name)

Broadly cone-shaped or irregular trees of medium size. Lvs. evergreen, 4-10cm. long, needle-like, in groups of 2, 3, or 5, with a common sheath at base.

Pollen with 2 empty floats. Fr. a cone of persistent scales, each with 2 seeds at base.

Note: Trees of this genus furnish all of the white and yellow pine lumber of commerce. There are 80 species, all in the northern hemisphere, 20 in North America. Rosin and turpentine and "hard pine flooring" are taken from the "long leaf pine" (*Pinus palustris*) of the southern states. Young shoots of this species are often shipped north for Christmas decorations. Cones of the 5-lfd. or "white" pines ripen in one season; those of the 2- or 3-lfd. or "yellow" pines require two summers.

- | | |
|--|------------------------------|
| 1. Lvs. in 5's, slender | 2 |
| 1. Lvs. in groups of 2 or 3 on the same tree | 8. <i>P. ponderosa</i> |
| 1. Lvs. in groups of 2 strictly | 3 |
| 2. Lvs. dark green, branchlets smooth | 1. <i>P. Strobus</i> |
| 2. Lvs. bluish white on inner sides; branchlets finely hairy | 2. <i>P. Cembra</i> |
| 3. Low and shrubby | 4. <i>P. montana mughus</i> |
| 3. Trees | 4 |
| 4. Branches covered with old cones; lvs. short | 3. <i>P. Banksiana</i> |
| 4. Cones few, not remaining long on tree after opening | 5 |
| 5. Lvs. 4-6cm. long; bark papery, yellow | 5. <i>P. sylvestris</i> |
| 5. Lvs. 6-14cm. long; twigs dull orange color | 6. <i>P. resinosa</i> |
| 5. Lvs. 6-14cm. long; twigs dull grey | 7. <i>P. nigra austriaca</i> |

1. *P. STROBUS* White pine Weymouth pine

Lvs. in groups of 5, 6-8cm. long, soft and flexible, very dark green and feathery in appearance. Branchlets not hairy. Cones often curved, 1-1.5dm. long, slender; scales thin and pliable, without spines. Tree 20-50m. tall.

Stam. fl. oval, 8-10mm. long, with 6-8 bracts at base; pist. fl. long stalked, cylindrical. Seed smooth; cotyledons 8-10.

Sandstone bluffs, very rare here.

Eldora. Cult., common; campus.

Nfd. to Pa. and Ga., Man., Minn. and cent. Ia.

Fl. May-June. Fr. Nov.-Dec.

Note: This tree furnishes the true white pine lumber, unrivalled for smooth, firm, soft grain, ease of working, and freedom from swelling and warping. It is the best ornamental pine for Iowa. One authority pronounces it the most useful tree in the world. The locality at Eldora is the farthest natural outlier of the species toward the southwest. The next nearest natural occurrence is in Delaware county, Iowa. *P. flexilis* with 5 short stiff curved needles to a bunch is on trial at Ames and in Grinnell.

2. *P. CEMBRA* Swiss Stone Pine

Lvs. in 5's, 5-8cm. long, rather stiff, erect, dark green on outer side, bluish white on inner sides. Branchlets finely hairy.

Tree 20-40m. tall, narrowly and densely conical. Cones ovate, 6-8cm. long, with broad scales. Seeds 1cm. long, wingless.

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Cult. rare.

1502 East St.

European Alps.

Fl.

Fr.

3. *P. BANKSIANA* Banks's P. Jack Pine

Small tree with lvs. in 2's, 2-3cm. long, stiff. Branches beset with old dead cones. Bark black-grey.

Cone 4-5cm. long, scales thick, without a prickle. Resin ducts deep in leaf.

Cult. rare.

Mears Cottage, campus.

N. S. to Minn. and northward.

Fl. May

Fr. Oct.

4. *P. MONTANA MUGHUS* Mugho Pine Dwarf Mountain Pine

Treelike shrub, 5-20dm. tall. Lvs. in 2's, 3-4cm. long, stiff. Branchlets dull greenish brown; buds coated with resin.

Cone regular, conical; scales thickened at tip, with a prickle. Resin canals of leaf near epidermis.

Cult. frequent.

Quadrangle; 917 High St.

Mts. of central Europe.

Fl.

Fr.

5. *P. SYLVESTRIS* Forest P. Scotch Pine

Tree with orange-yellow papery bark on parts 5-25cm. thick. Lvs. in 2's, stiff, twisted, 4-7cm. long. Cones few, falling off in May each year, pointing away from apex of shoot (recurved), 4-6cm. long. Cone scales thick at tip, without a spine. Resin canals of leaf near epidermis.

Cult. common.

Campus.

Europe and n. w. Asia.

Fl. May.

Fr. Apr.-May.

Note: This species and *P. Strobis* and *P. nigra austriaca* are the only pines commonly found about lawns and windbreaks, and all are very common. While this is "one of the most important timber trees of Europe," and "is quite hardy," it "has little to recommend it as an ornamental tree" (Bailey's Cyclop.)

6. *P. RESINOSA* Resinous P. Norway Pine Red Pine

Tree with coarse brown bark; branchlets orange color. Lvs. in 2's, 6-14cm. long, slender, flexible.

Cones 4-6cm. long, the scales thickened, without a spine. Resin canals near epidermis.

Cult. rare.

Nursery.

Nfd. to Pa., Minn., Man. and northward.

Fl.

Fr.

Note: A valuable, hardy and vigorous ornamental, and important source of yellow pine lumber.

7. *P. NIGRA AUSTRIACA*

Austrian Pine

Tree with very coarse, grey-black bark; branchlets light brown. Buds not over twice as long as thick. Lvs. in 2's, 6-14cm. long, very stout and stiff, dark green.

Cones broad, 5-8cm. long, glossy; scales thickened, with a short prickle. Resin canals of leaf in midst of parenchyma.

Cult. common.

Campus; 4th and East Sts.

S. e. Europe.

Fl. May.

Fr. Oct.

8. *P. PONDEROSA*

Ponderous P.

Western Yellow Pine

Tree with coarse brown bark. Lvs. in 2's and 3's, 12-16cm. long. Buds large, candle-like, 3-6 times longer than thick.

Cones 8-15cm. long, brown and shiny; scales thickened, with a stout recurved prickle. Resin canals in midst of parenchyma of leaf.

Cult. rare.

Campus; nursery.

B. C. to Mex., east to Neb. and Tex.

Fl. May

Fr.

2. *Larix*

Larch

(The classical name)

Cone-shaped deciduous trees of large size. Lvs. needle-shaped, soft, 2-3cm. long, in clusters on knoblike, black short-shoots. Cones 1-5cm. long, soft, numerous.

Stam. fl. globular, dull yellow, drooping; pollen globular, not winged. Pist. fl. erect, conelike, bright red.

1. Cones 2.5-3cm. long; tree symmetrical

1. *L. decidua*

1. Cones 1-2cm. long; branches crooked

2. *L. laricina*

1. *L. DECIDUA*

Deciduous L.

European Larch

Cones 2-3cm. long. Tree with straight trunk, straight branches and slender, drooping branchlets.

Bract shorter than seminiferous scale, erect, or incurved; scale finely downy on the back; lvs. without white lines beneath.

EVERGREENS OF IOWA

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Cult. common.

Campus.

N. and cent. Europe.

Fl. April.

Fr. Oct.

Note: This is deservedly popular as an ornamental tree, and greatly superior to the following.

2. *L. LARICINA* Larch-like L. American L. Tamarack
 Cones about 1cm. long; trunk crooked, branches and branchlets curved.

Bract shorter than seminiferous scale, erect or incurved; scale glabrous; lvs. without white lines beneath.

Cult. frequent

Campus; 1807 Fourth Ave.; 1510 East St.

Lab. to Penna., Minn. and northward.

Fl. Apr.-May

Fr. Oct.

Note: The source of a tough, light timber, especially prized in ship building.

3. *Picea*

Spruce

(The latin name of a pine)

Cone-shaped evergreens with lvs. 1.5-2.5cm. long, bristling all round the branch; lvs. slightly curved, 4-sided or diamond shaped in cross section. Cones drooping.

Lvs. spirally arranged (one in a place) leaving a hard prickle when they fall off. Cone scales thin, roundish. Stam. fl. catkin-like, each sporophyll with 2 sporangia. Pist. fl. crimson, the rounded scales longer than the bracts. Winter buds interspersed with lvs. at ends of shoots.

- | | |
|--|-------------------------|
| 1. Twigs yellow; lvs. green; cones 10-15cm. long | 1. <i>P. abies</i> |
| 1. Twigs ashy yellow; lvs. ashy; cones 2.5-5cm. long | 2. <i>P. canadensis</i> |
| 1. Twigs pale; lvs. bluish-waxy, very sharp | 3. <i>P. pungens</i> |

1. *P. ABIES* Fir S. Norway Spruce

Large trees with horizontal branches and drooping branchlets. Lvs. pure green; branchlets deep yellow. Cones 1-1.5dm. long, the scales rounded.

Stam. fl. 2-3cm. long. Pist. fl. 3-4cm. long.

Cult. common.

Campus; 1302 East St.

Northern Europe.

Fl. May

Fr. Oct.

Note: Probably the best trees for windbreaks, retaining the foliage well down to the ground. Distinguishable when young by the color of twigs and lvs.

2. *P. CANADENSIS* Canada S. White S. Black Hills Spruce
Branches somewhat rising, the branchlets not drooping. Lvs. ashy green; branchlets pale ashy yellow. Cones 2-5cm. long, the scales rounded.

Pist. fls. about 2cm. long. Branchlets not hairy. Cones falling off at maturity (March-Apr.).

Cult. common.

Campus; nursery.

N. B. to S. Dak. and northward.

Fl. Apr.-May.

Fr. Oct.

Note: Often planted for ornament and for windbreaks, but less dense than the preceding. A hardy strain from the Black Hills of S. Dak. is cult. as Black Hills Spruce.

3. *P. PUNGENS* Piercing P. Colorado Blue Spruce

Branches horizontal, the branchlets stiffly horizontal or rising. Lvs. very stiff, needle-pointed, bluish white on the sides. Twigs with pale yellow bark.

Cones 1dm. long, hanging on a long time, the scales soft and thin, notched at margin. Branchlets glabrous.

Cult. common.

Campus.

Col., Utah, Wyo.

Note: The stiffest, and in its most waxy-blue forms, the most showy of evergreens; very variable in color. Healthy, hardy, clothed with lvs. to the ground; of fine conical form. *P. Engelmanni* will doubtless be introduced ere long; distinguished by having branchlets downy.

4. *Abies*

Fir Balsam

(The classical name)

Cone-shaped evergreens with lvs. 1-5cm. long, spirally arranged but spreading out in 2 rows, flat, paler beneath.

Twigs with flat circular scars where the lvs. have fallen off. Bark with swollen sacs of resin (balsam). Foliage and resin pleasantly scented, especially in drying. Cones erect, the scales falling from the axis at maturity. Winter buds crowded and touching at ends of shoots.

1. Lvs. 2cm. long or less

1. *A. balsamea*

1. Lvs. 2.5-7cm. long

2. *A. concolor*

1. *A. BALSAMEA* Balsam Fir Canada Balsam

Lvs. short, very dark green, 1-2cm. long, blunt. Tree slender and spirelike, thinly leafed.

Pist. fl. violet colored; cones cylindrical, 6-10cm. long, 2-3cm. thick.

Cult. frequently.

Nursery: Hazelwood.

Nfd. to Va., cent. Ia., and northward.

Fl. Apr.

Fr.

2. *A. CONCOLOR* One-color F. White Fir Silver Fir
Lvs. long, blunt, light green, flexible, 2mm. wide. Tree broadly conic, dense.

Cones 7-12cm. long, oblong, green, purple or yellow.

Cult. frequent.

Campus.

Oreg. and Col. to Mex.

Fl.

Fr.

5. *Tsuga* Hemlock

(Japanese name of one species)

Broadly conical evergreens, with slender branches, horizontal or drooping. Lvs. spirally arranged but displayed in 2 rows, short-stalked, and continuing down the stem as a low ridge. Cones small, 1-2cm. across. Stam. fls. axillary, stalked inside the bud scales. Pist. fl. terminal.

1. *T. CANADENSIS* Canadian Hemlock Eastern Hemlock

Characters of the genus.

Cult. rather rare.

Nursery; Woods farm.

N. B. to Wisc. and Ala.

Fl. Apr.-May.

Fr.

Note: This very feathery and beautiful tree is in many ways the most attractive of the evergreens. It is of slow growth, but seems perfectly hardy here. In the northern U. S. it formerly grew in great abundance. The wood has long been used in great quantities for rough construction work; it is coarse and splintery. The bark is very valuable for tanning. Much timber has been destroyed simply for the bark, the 3 or 4 ft. logs being left to rot. This process was formerly called "developing our resources;" it is now known to be destroying our heritage. Eastern hemlock lumber has nearly all been cut.

6. *Pseudotsuga* Douglas Fir

(Pseudo, false, and Tsuga)

Conical or oval dark green trees, with branches rising. Lvs. spirally arranged but spreading in 2 rows, flat, flexible, paler beneath, shedding so as to leave a round upraised scar. Winter buds conic, very sharp and smooth, chocolate brown.

Cones with 3-lobed bracts extending beyond the thin rounded scales.

1. *P. TAXIFOLIA* Yew-leaved P. Oregon Pine Douglas Fir

Characters of the genus.

Pist fl. a cluster of slender pink bracts. Bark with pustules of resin. Lvs. about 2cm. long.

Cult. frequent.

Campus; East city line.

B. C. to Mex. from Rocky Mts. to coast.

Fl. April.

Fr. Oct.

Note: The Douglas fir is the most majestic tree of the northwestern forests, towering to 70 m. in height, averaging 2 m. in diameter, and often attaining a diameter of 3 m. The timber is hard and of great value. In this region it is a handsome tree, but loses its lower branches rather early.

7. *Taxodium* Bald Cypress Southern Cypress

(*Taxus*, yew-tree; *oidos*, resemblance. The foliage resembles that of the yew-tree)

Conical tree with stringy bark. Lvs. spirally arranged but spreading out in 2 rows, light green, 15mm. long, 1-2mm. wide. Leaf-bearing twigs fall off in autumn with the lvs.

Cones spherical, rough, Stam. fl. in branching spikes, the scales bearing 2-5 sporangia.

1. *T. DISTICHUM*

Two-rowed T.

Characters of the genus.

Cult. very rare.

Campus.

Del. to s. Ill., Mo., Fla., and Tex.

Fl. May.

Fr.

Note: One specimen of this tree prospers on the Grinnell College campus. It is native of swamps, often in deep water, in the southern states. There it grows to a great diameter, and sends up huge woody breathing roots called cypress or cedar "knees," often 2 m. high and 3 dm. thick. The cypress lumber now so much used comes from this tree, but not the so-called cypress shingles. Shingles are made from *Chamaecyparis thyoides* in the east, and from *Thuja plicata* in the west; both are then called cypress or cedar.

8. *Thuja*

Arbor-vitæ

(A Greek name of some resinous evergreen)

Small evergreen trees with flat twigs. Lvs. scale-like, opposite, in 4 ranks; two of the ranks have flat lvs., the other two have the lvs, folded or "keeled."

Pist. fl. about 2mm. across, greenish white; Stam. fl. brown, 3mm. across, each scale with 4 sporangia. Cone scales opposite, 4-ranked, 8 or 10 in number.

1. Twigs horizontal, with distinct upper and lower sides; cone dry, scales thin
1. Twigs vertical, both sides alike; cone fleshy-knobbed

1. *T. occidentalis*

2. *T. orientalis*

1. *T. OCCIDENTALIS*

Western T.

American Arbor-vitæ

Twigs mostly horizontal, always with upper and lower surfaces different. Cone scales thin, flat.

Cult. common.

Campus; Woods farm.

Queb. to N. C., Minn. and Man.

Fl. March-Apr.

Fr. Oct.

Note: A valuable ornamental, appearing in many forms: globular, pyramidal, golden, etc. It furnishes the white cedar posts and telephone poles of the middle west. Its home is in cold northern bogs.

2. *T. ORIENTALIS* Eastern T. Oriental Arbor-vitæ

Twigs mostly vertical, without distinction of upper and lower sides. Cone scales with a prominent fleshy knob.

Cult. rare.

Nursery; Traer, Ia.

Persia to e. Asia.

Fl. Apr.

Fr.

Note: A pleasing ornamental, but often suffering winter injury. It becomes a large tree in favorable conditions. The young plants of this genus have needle-like lvs. 0.5-1 cm. long; specimens which retain this juvenile foliage are often cult.

9. *Juniperus*

Juniper

(A classical name)

Evergreens with small lvs. which are needle-like or scalelike, opp. or whorled in 3's.

Pist. fl. 2mm. wide, greenish white, of about 6 opposite 4-ranked scales. Stam. fl. ovoid, 3-4mm. long, brown, with 8-12 opposite scales, each with 3-4 sporangia. Fr. a fleshy "berry," black or bluish-waxy.

1. Erect shrub; lvs. in whorls of 3, needle-shape, at rt. angles to stem
1. *J. communis*
1. Sprawling shrub; lvs. in 2's or 3's, short, slightly spreading
2. *J. horizontalis*
1. Erect tree; lvs. mostly opposite, needle-like or scalelike; if needle-like, at acute angle with stem
3. *J. virginiana*

1. *J. COMMUNIS*

Common J.

Erect, much branched, columnar shrub, to 1-2m. tall, with lvs. whorled in 3's, about 1cm. long, standing nearly at right angles to stem, bluish-waxy above.

Fls. axillary. Lvs. 12-20mm. long. Berry 6-8mm. in diameter.

Cult. rare.

Nursery.

Mass. to N. C., N. Mex. and Man.; also in Europe. Rare in America.

Fl. Apr.

Fr. Sept.

Note: An ornamental columnar evergreen, but too tender for our winters. The berries are used in medicine, and formerly served to flavor that strong alcoholic beverage Gin (short for Geneva).

2. *J. HORIZONTALIS* Horizontal J. Savin

Low trailing shrub, 0.5-1m tall, the trunk horizontal, the branches

wide spreading. Lvs. needle-like, or scalelike and needle-pointed, usually opposite.

Berry on a short recurved stalk.

Cult. frequent.

Nursery; 1510 Broad St.

Nfd. to Minn. and northward.

Fl.

Fr.

Note: A very desirable and hardy low dark evergreen.

3. *J. VIRGINIANA* Virginia J. Red Cedar

Trees to 15m. tall, pyramidal, dark green. Bark fibrous. Lvs. opposite (sometimes whorled in 3's), on young specimens needle-shape, 5-7mm. long; on mature trees scalelike, closely pressed to the twig, giving the smallest branchlets a square shape.

Berries on straight stalks. Fls. at end of branchlets; stam. cone 3mm. long, brown; pist. fl. about 1mm. long, whitish green.

River bluffs, frequent; cult. common.

Moore; Eldora; campus.

Maine, southward and westward.

Fl. April.

Fr. Oct.

Note: A good hardy ornamental, losing its lower branches. Cult. in many shapes and tints of foliage. The red and deliciously scented heart wood is soft and easily worked, and takes a high polish; it is used in making "moth proof" and ornamental chests and window seats.

Family 7. TAXACEAE

Yew Family

Shrubs with ovules borne singly and exposed on the ends of short scaly shoots; pollen in globular strobili, 2-4mm. in diameter. The exposed dark brown seed, 2-4mm. across, is borne in a fleshy crimson cup 1cm. in diameter.

Taxus

Yew

(Taxon, bow; the wood having been formerly used for bows)

Characters of the family.

1. *T. CANADENSIS*

Canada Yew

Lvs. linear, narrowed to a very short stalk, 1.5-2.5cm. long, green on both sides. Pollen and ovules on different plants.

Moist shaded bluffs, very rare.

Palisades of Cedar River.

Nfd. to Va., Ia. and Man.

Fl. Apr.

Fr. Oct.

Note: *T. cuspidata* of Japan has been tried in gardens, but rarely survives our winters.

GRINNELL COLLEGE,

GRINNELL, IOWA.