

Acarospora

After Magnusson, Clauzade & Roux, and others

Rev. 2/94; Very Preliminary!

At present this is one of the most difficult lichen genera in North America. On the one hand there are the treatments by Magnusson, who tended to "split" too much, while the other extreme is Weber, who "lumped" all yellow species into 2 (and, in his herbarium, also lumped many of the brown or white species). This key, like most of my other ones, is an attempt to make some sort of sense out of the North American species, based on the literature.

Names in **bold** are ones accepted by Europeans or by some N. Americans (other than Weber) as being good taxa; whether they actually occur in North America is a different question. Undoubtedly there will be many additions and deletions as more critical studies are made.

I-A. Thallus \pm yellow, radiately lobed; on rock **(A. chlorophana sensu Weber)**

1. Epiphytic on Caloplaca trachyphylla. [Note: Magnusson treats this as a lobed species, but it's not very distinctly lobed, and Weber treats it as a synonym of A. schleicheri] (see **A. stapfiana**)

1. Not epiphytic on Caloplaca. 2

2. Hymenium 100-200 μ m high. Similar to A. hiliaris but excipulum distinct; asci inflated; areoles and lobes thicker, larger and more convex; discs \pm dilated. Apothecia usually 1/areole, 0.1-0.3 mm wide; disc plane, sordid reddish yellow; margin prominent. Cortex 30-35 μ m thick; cells 3-4 μ m. Thallus center areolate-verrucose. Upper surface dark citrine. Thallus C-. Upper surface greenish yellow. (Probably including A. incertula, from New Mexico, with lobes slightly more yellowish and lobes slightly longer and narrower, cortex 45-65 μ m thick; apothecia lacking). New Mexico. A. novomexicana =? Pleopsidium chlorophanum

2. Hymenium under 100 μ m high. 3

3. Thallus cortex and medulla C+ red; discs C+ pale rose (gyrophoric acid). Similar to A. novomexicana but thallus more distinctly effigurate, with closely appressed, plane and thinner lobes and apothecia several per areole. Lower side dark. Areoles very convex in thallus center. Hymenium 100-135 μ m. Epihymenium dark. Apothecia punctiform or dilated to 0.5 mm, 2-5/areole. Thallus center verrucose-areolate. Upper surface dark citrine yellow. Discs pale yellow to blue-gray. Thallus center areolate-verrucose. Lobes contiguous. Cortex 30-40 μ m. New Mexico. **A. erythrophora** =? Pleopsidium chlorophanum

3. Thallus and apothecia C-, without gyrophoric acid. 4

4. Thallus (medulla only) K+ red, with norstictic acid. Thallus at most only indistinctly lobed. (**A. heufleriana**)

4. Thallus K-. (also see A. heufleriana v. massiliensis). 5

- 5. Apothecia immersed, punctiform, or dilated to 0.5 mm wide. 6**
5. Apothecia 0.5-1 mm broad, ± prominent, 1-3/areole. Lobes well-developed, to 2 mm long, 1 mm wide. With rhizocarpic acid (yellow pigment). On steep or overhanging non-calcareous rocks, usually in cool or cold areas. 8

6. Spores 3-4.5 x 2-2.5 um. Lobes 1-3 mm long, 0.5-1 mm wide. Apothecia dilated, 0.3-0.5 mm diam; discs grey-yellow or olive-yellow. Cortex 25-35 um thick. Lobe surface rough. Similar to A. novomexicana but apothecia larger, ± immersed, level with thallus; spores fewer (ca. 200/ascus) and smaller. Hymenium 80-85 um. Thallus verrucose-areolate in center; areoles to 0.6 mm diam.; 0.5-0.7 mm diam., or with lengthened, lobe-like parts as continuation of the lobes, separated by distinct thin cracks; lobes distinct, contiguous, incised, plane or slightly convex, somewhat thickened; upper surface greenish citrine yellow, matt; underside pale. Apothecia 1/areole, numerous only at center of thallus, immarginate, round or irregular, in thallus level. Paraphyses 2 um thick, tips scarcely thickened. Spores 3-4.5 x 2-2.5 um, ellipsoid. Cortical cells 3-3.5 um. Thallus K-, C-, P-. On conglomerate and basalt, Colorado, Washington. A. weldensis =? Pleopsidium chlorophanum

6. Spores 1.5-2 um wide. Lobes to 0.6 mm wide. Apothecia punctiform; discs ± reddish or brownish. Cortex 30-60 um thick. 7

7. Hymenium 65-70 um. Spores 3-4.5 um long. Cortical cells very small (1 um), indistinct. Medulla opaque. Upper surface of areoles pale yellow. Lobes 1.0 mm long. Apothecia present only in the central areoles, few, punctiform (incipient), 0.1-0.3 mm diam., immersed, 1/areole; disc pale yellow-brown, concave, smooth. Paraphyses to 2 um, tips not capitate. Spores ca. 100/ascus, 3-4.5 x 1.5-1.8 um, ellipsoid. Thallus 0.5-1 cm across. Cortex 35-50 um. Lobes contiguous, 1 mm long, 0.5-0.75 mm wide, plane or slightly convex, matt, smooth, ca. 0.2 mm thick; central areoles contiguous, angular, separated by thin cracks, 0.3-0.4 mm thick, the fertile ones ± slightly verrucose, broadly attached; lower surface pale. Medulla opaque. Exciple narrow (8-12 um). On granitic rock, Texas. A. texana =? Pleopsidium chlorophanum

7. Hymenium (85-)100 um. Spores 4-6 um long. Cortical cells 2-3 um. Medulla transparent. Upper surface greenish yellow to bright yellow. Lobes 1-3 mm long. Rhizocarpic acid only. Lobes 0.3-1 mm wide. Upper surface epruinose, slightly glossy. Outer lobes thin, tending to be plane or slightly convex. Thallus center finely areolate; areoles plane or slightly convex. Apothecia 1(-3)/areole, immersed, punctiform; discs carneous brown, 0.1-0.25 mm. Paraphyses 1.8-2 um at base, the apices scarcely enlarged. Pycospores 2.5-3 x 0.6-0.8 um. On overhangs of very hard, non-calcareous rock (e.g., granite). New Mexico. A. hiliaris

8. Apothecia flat with persistent margins. Marginal lobes well developed, 1.5-2 mm long; upper surface ± rough and rugose. Spores 4-5 x 1.7-2 um. Thallus often covering large areas. Hymenium 60-90 um. With lichesterinic acid (fatty acid). Disc a little more reddish and clearly darker than thallus; margin often somewhat rugose or crenulate. Apothecia 1(-3)/areole. Upper surface of thallus citron yellow, often bright, slightly glossy. Paraphyses to 2 um thick at base, tips not swollen. Asci clavate. Pycospores 2-2.5 x 0.7-0.9 um. Spores ca. 100/ascus, rather narrowly ellipsoid. With

rhizocarpic acid. On perpendicular or overhanging non-calcareous rock surfaces (e.g., granite), subalpine to alpine. A. oxytona (synonym? A. flava; including var. substerilis Magnusson, with irregularly expanded thallus often lacking apothecia, from New Mexico) = **Pleopsidium flavum**

8. Apothecia soon \pm strongly convex and emarginate. Marginal lobes poorly developed, 0.5-1.0(-2?) mm long; upper surface smooth. Spores 3-4 x 1.5-1.7 μ m. Hymenium 45-60 μ m. With acarenoic and acaranoic acids (fatty acids). Thalli often small & scattered. Discs pale yellow, only slightly brownish, scarcely darker than thallus. Paraphyses less than 2 μ m thick at base; tips hyaline, scarcely thickened, 2-3 μ m. Asci broadly clavate; tips I+ dark blue, with Lecanora-type amyloid ring (true Acarospora species have the hymenium I+ greenish to pale blue, without such a tholus, and the hymenium is higher). Pycnospores broadly ellipsoid, 3-3.7 x 1.5-1.8 μ m. On overhanging rock surfaces not receiving moisture directly. Arctic-alpine. Okanogan Co., Washington (material at least chemically corresponding to this species). Reported from Alaska to Greenland. **Pleopsidium chlorophanum**

I-B. Thallus \pm yellow; not radiately lobed
(A. schleicheri sensu Weber)

1. On soil. Squamules 1-2(-5) mm across, the marginal ones sometimes slightly elongated, often indented to weakly lobed; upper surface pale greenish yellow to dark yellow, often fading and becoming white. Thallus often covering extensive areas, closely adnate. Apothecia 1(-3 or rarely more)/areole, 0.5-1.0 mm diam., prominent or not; disc reddish brown or dark brown, plane or frequently convex, rather regularly rounded; margin little prominent but generally rather distinct; hymenium 85-110 μ m high; paraphyses less than 2 μ m thick at base, not enlarged at tips; spores 3-4 x 2-2.5(-3) μ m, ellipsoid to subglobose. With rhizocarpic acid only. On dry, neutral or calcium- or gypsum-rich soil in arid or semi-arid areas. Young thallus (at least in Europe) frequently parasitic on Diploschistes ssp. Mexico to Alaska, eastward in the arctic (and elsewhere in western N. America). There may be more than one yellow species growing on soil, but this is the only one described at present. **A. schleicheri s. str.**

1. On rock, or on lichens on rock. (Some of these, though surely not as many as Weber believes, conceivably could be synonyms of A. schleicheri, but I haven't yet figured out where A. schleicheri s. str. would fit if it did occur on rock). 2

2. Discs distinctly blackish, dilated. Spores globose or subglobose (if spores ellipsoid see A. contigua and perhaps others). 3

2. Discs yellowish to reddish brown, usually not very dark, or apothecia punctiform or absent. Spores ellipsoid (or subglobose in A. heufleriana and A. ocellata). 4

3. Usually epiphytic or parasitic on Caloplaca trachyphylla, on \pm calciferous rocks. Upper surface pruinose, greenish yellow. Thallus determinate, forming 1-1.5 cm large areas, at the circumference thinnear and at least partly radiate-lobate, the central part areolate. Areoles 1-1.8 mm broad, angular, very thick and crowded. Apothecia usually 1/areole, very irregular in shape; discs dilated, 1.5-2 mm broad, greenish black or brownish black. Paraphyses under 1.8 μ m thick; tips slightly swollen, to 3 μ m, dark. Hymenium 100-120 μ m. Spores globose or subglobose, 3-4.5 x 3 μ m, 100-200/ascus. Upper cortex 50-65(-75) μ m thick; cells 2-3 μ m diam. With rhizocarpic acid only. Very common in drier parts of temperate western N. America.

A. stapfiana

3. Not on Caloplaca (but may be on other lichens). Discs brown-black; apothecia often 1 per areole (but sometimes \pm numerous). Paraphyses tips clearly capitate. Spores 3-5 x 2-4 μ m, subglobose. Areoles contiguous to imbricate or often rather dispersed, large (1-2 mm), rounded or angular, sometimes slightly crenulate, plane or slightly convex. Upper surface smooth but frequently uneven, citrine yellow, somewhat dark yellow, or whitish. Apothecia \pm deeply immersed, round or elongated; usually punctiform, but rarely discs dilated, 0.2-0.5 mm; margin little prominent but very distinct. Hymenium (85-)100-125(-150) μ m. Paraphyses less than 2 μ m thick at base, tips clearly capitate, to 4 μ m, brown. Cortex thick (50-90 μ m or more); lumina large (3-7 μ m), distinct. Pycnospores ellipsoid, 2-2.5 x 1-1.3 μ m. On non-calcareous or slightly calcareous rocks, or often overgrowing other lichens. California, Colorado, Arizona. **A. bella** (synonym: A. rhabarbarina Hue, a nomenclaturally superfluous name; synonymized under A. xanthophana in one of Magnusson's articles but kept separate elsewhere) =? A. schleicheri

4. **Thallus (medulla only) K+ red (norstictic acid).** Thallus areolate-squamulose, not lobed. Discs \pm dilated, 0.3-0.7 mm. 5
4. **Thallus K- (no norstictic).** 6

5. Epiphytic or parasitic on Lecanora valesiaca when young. Spores broadly ellipsoid or globose, 3-4.5 x 2-2.5 μ m. Apothecia often 2-6 per areole; discs naked, yellowish brown, 0.3-0.7(-1) mm diam., punctiform and concave, then plane, sometimes rugose, slightly immersed or level with the thallus, irregularly rounded; margin concolorous with thallus, little prominent, often indistinct. Hymenium 85-125(-135) μ m. Paraphyses not enlarged at tips, to 2 μ m thick. Spores 100-200/ascus in optical view. Upper surface of thallus bright yellow, yellow green to whitish yellow with pruinose areas. Thallus well delimited or not, occasionally weakly effigurate; areoles 0.5-2 mm diam., usually grouped and angular and plane, but sometimes dispersed, rounded and \pm convex. With rhizocarpic acid; norstictic acid only in the medulla. Usually on fairly steep south-facing, hot and dry non-calcareous rocks, \pm western U.S. east of the Sierras and Cascades. **A. heufleriana**

5. Not on L. valesiaca. Spores narrowly ellipsoid, under 2 μ m wide. Apothecia often 1 per areole; discs bare to white pruinose. Upper surface of areoles pruinose, partly dark citrine yellow. Areoles contiguous, \pm grouped in 0.5-1.5 cm wide areas, 0.6-1(-1.5) mm broad, 0.2-0.4 mm thick, plane or slightly uneven, smooth, broadly attached. Upper cortex 30-40 μ m; cells 2-2.5(-3) μ m diam. Norstictic acid in medulla. Discs plane, 0.3-0.5(-0.7) mm broad, pale brown or fulvous brown, round, level with thallus or slightly depressed. Hymenium 85-100 μ m. Paraphyses under 2 μ m thick, the tips not swollen. Spores 100-200/ascus, ellipsoid, 3-5 x 1.7-2 μ m. On non-calciferous, close-grained rock, Texas. **A. rubicunda** =? **A. schleicheri**

6. Spores broadly ellipsoid or subglobose. 7

6. Spores \pm narrowly ellipsoid, under 2 μ m wide. (numerous taxa; revision of keys necessary). 8

7. Areoles \pm dispersed or irregularly grouped. Discs pale to rather dark brown. Areoles little or not projecting above the substrate, plane or slightly convex. Hymenium 100-140 μ m. Paraphyses less than 2 μ m thick at base, scarcely or not enlarged at tips. Apothecia 0.3-0.6 mm diam., remaining \pm immersed in thallus, but disc rather rapidly expanded, rounded; thalline margin little distinct or slightly prominent. Areoles 0.4-1.5 mm; upper surface pale citrine yellow, often slightly pruinose; lower surface pale. Spores 3-4.5 x 2-3 μ m, broadly ellipsoid or subglobose. Cortex 30-50 μ m thick. On non or slightly calcareous rocks or overgrowing other lichens, especially Candelariella vitellina. Thallus K-. (**A. heufleriana** v. **massiliensis**)

7. Areoles contiguous. Discs rather pale, fulvous, yellow-brown to red-brown. Hymenium 85-125(150) μ m. Paraphyses under 2 μ m thick at base. Apothecia 2-5(12) per areole. Paraphyses tips indistinct, in gelatinous matrix. Areoles mostly 1-1.5(-2) mm diam., to 1 mm thick, irregularly angular and dividing into smaller parts by cracks (some very wide, to 0.2-0.3 mm); upper surface rather smooth to slightly undulating or rough. Apothecia numerous; discs large (0.2-0.5 mm), slightly sunken; exciple edge distinctly visible, somewhat prominent, giving the apothecia an eye-like appearance. Spores 4-5 x 2.7-3.5 μ m, at least 100/ascus. Paraphyses ca. 1.5 μ m thick. Cortex ca. 50 μ m thick; cells 3-3.5 μ m wide. Hymenium 85-125 μ m. Thallus K-, C-, P-. On sandstone. Colorado. **A. ocellata** =? **A. schleicheri**

- 8. Hymenium below 85 um high.** Upper surface epruinose. 9
8. Hymenium above 85 um high. 11

9. Areoles dark below. Similar to A. chrysops but apothecia 1(-3)/areole; disc pale, \pm yellowish brown; hymenium low (70-85 um). Apothecia few, 1-3/areole, 0.2-0.5 mm diam.; older ones surrounded only by the ring-like thallus edge. Paraphyses under 2 um wide at base, tips slightly swollen, 2-2.5 um thick, bronwish. Pycnospores 2 x 1.2 um. Cortex 35(-50) um thick; lumina 2.5-3.5 um diam. Areoles \pm dispersed, subconvex, 0.3-0.5(-0.7) mm across, 0.2-0.3 mm thick; Upper surface epruinose. Spores narrowly ellipsoid, 100-200/ascus, 4-5 x 1.8 um. Thallus K-. On granitic rock, overgrowing cyanobacteria, sometimes invading other lichens. Alabama, S. Carolina. A. dissipata =? A. schleicheri

9. Areoles pale below. 10

10. Areoles 0.3-0.5 mm across, 0.2(-0.3) mm thick. Cortex thin ((20-)30-40 um); cells 2.5-3.5 um. Hymenium low (under 85 um). Spores narrow-ellipsoid, 100-200/ascus, 3.5-5 x 1.7-1.9 um. Thallus indeterminate. Discs 0.1-0.2 mm, level with thallus, slightly depressed. Paraphyses under 2 um wide at base, the tips mostly slightly widened. Areoles subdispersed. Apothecia regularly present. Areoles plane, broadly attached; Upper surface epruinose. With rhizocarpic acid and occasionally acaranoic and acarenoic acids. On granitic rocks. A. citrina (synonymized under A. xanthophana in one of Magnusson's articles, but kept separate elsewhere)

10. Areoles 0.5-1 mm wide, 0.4-0.6 mm thick. Similar to A. socialis but cortex thin (under 50 um); hymenium low (85 um); apothecia small (0.2-0.5 mm). Spores 5-7 x 1.7-2 um, at least 100/ascus, \pm cylindric. Paraphyses under 2 um wide; tips not thickened. Upper surface of areoles citrine, epruinose. Areoles \pm dispersed, convex. Discs yellow-brown. Apothecia 1/areole, immersed, depressed. Thallus K-, C-, P-. Areoles irregular in shape. Cortex little developed or to 35 um thick; cells 3-4 um. On sandstone. California and Colorado. A. intercedens =? A. schleicheri

11. Hymenium above 125 um high. Upper surface epruinose. 12

11. Hymenium 85-125 um. high. 14

12. Upper cortex under 70 um thick. Apothecia small, punctiform, immersed; disk yellow. Areoles contiguous and separated by thin cracks, or towards the circumference dispersed, \pm plane, 0.6-1 mm diam., angular, 0.3-0.4 mm thick, broadly attached; single areoles sometimes sublobate; upper surface citrine yellow, epruinose. Cortex 40-60 um thick; lumina 2-2.5(-3) um. Medulla transparent; hyphae leptodermatous. Thallus K-, C-. Spores 5-7.5 x 1.6-1.9 um, narrowly ellipsoid or subcylindrical, ca. 100-200/ascus. Lower side pale. Paraphyses to 2 um thick; tips not capitate. Thallus K-, C-. On non-calcareous rocks. Mexico, New Mexico. A. amabilis =? A. schleicheri

12. Upper cortex usually over 70 um. thick. 13

13. Cortical cell lumina indistinct, ca. 2 um. Apothecia very small, punctiform, immersed. Areoles imbricate, large (1-3(-7) mm across), narrowly gomphate, in groups. Apothecia numerous, 4-8/areole, with a usually distinct proper margin. Cortex 70-100 um thick. Hymenium 120-140 um. Medullary hyphae pachydermatous. Discs yellow-brown to dark

brown. Lower side blackish. Upper surface epruinose. Arizona. A. xanthophana =? A. schleicheri

13. Cortical cell lumina 3-4 um diam. Apothecia large (1-1.5 mm), prominent. Thallus areolate, apparently indeterminate (margin not observed); areoles squamule-like, usually distinctly peltate, contiguous to imbricate, confluent, 1-3 mm broad, 0.7-1.5 mm thick, on the whole plane or slightly convex though very uneven and \pm verruculose from numerous pycnidia; upper surface somewhat dark greenish yellow, matt; margins often free, especially in the \pm panniform areoles; lower surface pale. Upper cortex very uneven in thickness (varying from specimen to specimen). Apothecia few, immersed to slightly raised; discs plane, rough from yellow remains of the cortex, pale reddish brown or yellowish brown; margin distinct, prominent, thick. Thallus K-, C-. Spores ellipsoid, 100-200/ascus, 5-6 x 1.8-2 um. Paraphyses under 2 um wide, very discrete, tips scarcely swollen, 2-2.5 um. Upper cortex 70-100 um thick. Hymenium (110-)120-135 um. Medulla filled with granules. Discs rugulose. Pycnospores narrowly ellipsoid, 2-2.5 x 0.8-1 um. Upper surface epruinose. On granitic or volcanic rocks. California, Colorado. A. evoluta =? A. schleicheri

14. Upper surface of thallus pruinose. Key I-B-1

14. Upper surface of thallus not pruinose. [This is a bad choice, from the point of view of a natural classification, but a convenient one for an artificial key, and I don't have any better ideas at present]. Key I-B-2

I-B-1. Upper surface of thallus pruinose.

1. On non-calcareous rock. 2

1. On calcareous rock. Upper cortex 35-50 μm thick, with 15-30 μm thick epinecral layer; lumina indistinct, 1.5-2.5 μm . Thallus indeterminate; areoles contiguous, separated by very thin cracks or subdispersed, 1-2 mm broad, 0.4-0.7 mm thick; upper surface very smooth, pruinose, velvet-like, whitish (but yellowish tinted when wet), plane, with appressed edges, broadly attached to substrate. Thallus K-, C-. Apothecia punctiform, 0.1-0.2 mm diam., round; disc lead colored or blackish, somewhat yellowish brown tinted when wet. Hymenium 100 μm thick. Paraphyses 1.7-2 μm thick; tips yellowish brown, only slightly swollen, 2.5-3 μm thick. Spores ca. 200/ascus, narrowly ellipsoid, 4-5.5 x 1.7 μm . On porous calcareous stone, Texas. 3

2. Cortex 25-35 μm thick; lumina small (1.5-2 μm). Upper surface of areoles pruinose, pale (because of the pruina?) toward center. Discs dilated, 0.2-0.4 mm, pale or dark dirty brown. Areoles \pm gomphate (peltate), 0.5-1(-2) mm broad, 0.2-0.4(-0.6) mm thick, contiguous and irregularly angular or partly subdispersed, plane or subconcave. Lower surface dark brown or sometimes paler. Spores 1.5-2 μm wide, 100-200/ascus. Hymenium 85-125 μm . Medulla transparent. Pycnospores ellipsoid, 2 x 0.6 μm . Thallus K-. Paraphyses to 2 μm thick at base, the tips scarcely swollen, 3 μm thick, somewhat darkened. With rhizocarpic acid only. On volcanic or granitic rocks, \pm nitrophilous, sometimes overgrowing other lichens (e.g., young thalli of *Parmelia* s. lato). Texas, Colorado, Kansas, South Carolina, New Mexico; and Mexico. *A. chrysops* =? *A. schleicheri*

2. Cortex much thicker (50-100 μm). Similar to *A. chrysops*. Lower surface pale. Areoles plane; upper surface fissured, pale citrine to white pruinose. Spores 3.5-5 x 1.7-2 μm . Discs 0.1-0.3 mm, \pm olive yellow, punctiform or very irregular in shape. Paraphyses to 2 μm thick at base; apices indistinct in conglutinated epithecium. Hymenium 85-125 μm . Cortical cells small (2.5-3 μm). Cortex 50(-60) μm thick. Areoles (0.5-)0.8-1.5 mm across, 0.4-0.6 mm thick, \pm contiguous in 0.5-1.5 cm large groups, often scattered or a few approaching, irregular in shape, mostly with blunt angles, occasionally sublobate. Apothecia mostly 2-5(-8)/areole, rather inconspicuous. On volcanic rocks. New Mexico. *A. rimulosa* =? *A. schleicheri*

3. Upper cortex less than 50 μm thick. Upper surface of thallus smooth, pruinose, velvet-like, cream-colored (yellowish when moist). Apothecia small, punctiform, dark. Hymenium 85-100 μm . Thallus K-. Lower surface pale. Thallus \pm lobate. Spores ellipsoid. On calcareous rocks, Texas. *A. albida* =? *A. schleicheri*

3. Upper cortex 50(-100) μm thick. Areoles dispersed, rounded; upper surface pale citrine or whitish, pruinose. Thallus K-. Spores 1.5-2 μm wide. Discs 0.4-0.6 mm, brownish red; margin not prominent. Hymenium 85-125 μm . Spores \pm narrowly ellipsoid, 100-200/ascus, 4-5 x 1.8-2 μm . Paraphyses firmly coherent, to 2 μm wide at base, tips slightly swollen, 2.5 μm , brownish. On calcareous sandstone. California and Texas. *A. subalbida* (synonym: *Lecanora xanthophana* Tuck., non Nyl.; synonymized under *A. albida* by Magnusson, but *A. subalbida* is the earlier name) =? *A. schleicheri*

I-B-2. Upper surface of thallus epruinose

1. **Areoles peltate, often large, thick or thin.** (if thallus pruinose, see A. chrysops). 2

1. **Areoles not peltate, small, mostly thin.,** dispersed to contiguous, not imbricate. (If thallus pruinose, see A. rimulosa, A. albida and A. subalbida). 5

2. **Areoles dispersed,** very large, 1-2(-3) mm wide, 0.4-0.5 mm thick (to 0.7 mm thick at center), very irregular in shape, the free margin thinner, \pm depressed toward the rock; attached by a usually root-like umbilicus 0.2-0.3 mm long. Upper side epruinose, with simple or crossing cracks which often do not reach the edge, partly with dense punctiform impressions in connection with the cracks, probably indicating pycnidia or apothecial initials. Paraphyses 1.7 μ m thick, tips scarcely thickened. Apothecia disc divided by sterile tissue into smaller, irregular parts. Thallus K-, C-, P-. Spores probably not more than 50/ascus, oblong, 4-5 x 1.7 μ m. Hymenium ca. 100 μ m. Apothecia rare, mostly punctiform, when well developed to 1.5 mm diam. Cortex 50-70 μ m; cells ca. 3 μ m diam. On hard, probably siliceous, rock. Arizona. A. radicata [listed as an accepted name by Esslinger & Egan]

2. **Areoles contiguous to imbricate.** California. 3

3. **Hymenium 90-120 μ m.** Areoles contiguous or approaching, with narrow cracks, usually angular or irregular, occasionally even sublobate, of unequal size, 0.3-1(-1.5) mm broad, 0.3-0.5(-0.8) mm thick, smooth, convex, with appressed or rarely rising margins, distinctly gomphate with the lower side usually dark brown to black; upper surface bright yellow or greenish yellow or \pm dark citrine, epruinose. Thallus K-. Spores narrowly ellipsoid, 100-200/ascus, 4-5.5 x 1.8 μ m. Cortex 40-70(-85) μ m thick (thinner at margins); cells 2.5-3.5 μ m. Medullary hyphae leptodermatous. Apothecia in some parts of the thallus crowded, in others absent, 1(-24)/areole, at first punctiform, soon dilated, immersed; disc dark brownish red, round or somewhat irregular, (0.3-)0.5-1(-1.5) mm broad, smooth and plane, surrounded by the prominent margin of the areola. Paraphyses 1.7-2(-2.5) μ m thick at base, tips scarcely enlarged, yellowish brown, to 3 μ m thick. Pycnosporos 2-2.5 x 0.6-0.9 μ m, ellipsoid. On granite rocks, California and Mexico. A. socialis (accepted as a species by Esslinger & Egan)

3. **Hymenium over 125 μ m.** 4

4. **Cortical cell lumina indistinct, ca. 2 μ m.** Apothecia very small, punctiform, immersed. (A. xanthophana)

4. **Cortical cell lumina 3-4 μ m diam.** Apothecia large (1-1.5 mm), prominent. (A. evoluta)

5. **Areoles \pm dispersed, thin.** 6

5. **Areoles contiguous.** 8

6. **Lower side dark.** (A. dissipata)

6. **Lower side pale.** 7

7. **Areoles 0.5-1 mm wide, 0.4-0.6 mm thick.** (A. intercedens)

7. Areoles 0.3-0.5 mm across, 0.2(-0.3) mm thick. (A. citrina)

8. Hymenium high (135-170 μm). (A. amabilis)

8. Hymenium 85-125 μm . Areoles contiguous. Discs black or blackish. 9

9. Apothecia common, 1-few per areole. Upper surface \pm vitelline (dark yellow). Areoles closely adnate, small, forming a smooth, continuous crust. Apothecia numerous especially towards thallus center, punctiform, 0.1-0.2(-0.3) mm, immersed level with thallus; discs black. Upper cortex and medulla with distinct lumina. Medulla transparent or opaque. Areoles 0.3-0.5(-1) mm across, towards the circumference very thin, in the center 0.3-0.4 mm thick and sometimes loosening, all irregularly angular, broadly attached. Lower surface pale. Upper surface epruinose. Cortex 35-50 μm thick; cells 2.5-3(-4) μm diam. Paraphyses 1.7 μm thick at base, apices slightly thickened, 2.5-3 μm . Hymenium 90-100(-120) μm . Spores ellipsoid, 100-200/ascus, 4-5 x 1.6-1.8 μm . Thallus K-. On \pm calcareous rock, Texas. A. contigua =? A. schleicheri

9. Apothecia rare, 1(-2)/areole. Upper surface dark greenish yellow, uniformly colored. Areoles 0.4-0.7(-1) mm across, 0.3-0.6 mm thick, plane or subconcave, broadly attached. Cortex 35-50 μm thick, with distinct epinecral layer; cells 2.5-3 μm . Upper surface epruinose. Similar to A. chrysops but areoles contiguous, small, thin. Apothecia very small 0.1-0.15 mm, punctiform, blackish, immersed, round, without prominent margin. Hymenium 85-100 μm high. Thallus K-. Spores ellipsoid, 100-200/ascus, 4-6 x 2(-2.5) μm . Paraphyses 2 μm thick, slightly brownish capitate to 3 μm , or not. Pycnospores ellipsoid, 2 x 0.6 μm . On volcanic rock. Mexico. (including v. invadens Magn., from Kansas, Texas and Mexico, with areoles thick, intense citrine yellow, contiguous or often subdispersed, invading other lichens, surface smooth, subconvex. Apothecia numerous, (1-)2-3(-4)/areole; disc 0.1-0.3 mm broad, pale or dark brownish). A. subcontigua =? A. schleicheri

ADD:

Growing in California. Upper surface of thallus pruinose. A. epilutescens
(Need to see Zahlbruckner's type description, not Magnusson's description, which is erroneous)

Areoles dispersed; upper surface pale citrine yellow, without paler center. Discs pale. Medulla opaque. Upper cortex less than 50 μm thick. Lower side dark. Upper surface epruinose. South America.(A. dissipata v. separalibis)