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INDHOLD

RUST-PIL (*SALIX CINEREA* SUBSP. *OLEIFOLIA*) – EN OVERSET PIL I DANMARK OG SKANDINAVIEN

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RUSTY SALLOW (*SALIX CINEREA* SUBSP. *OLEIFOLIA*) – AN OVERLOOKED SALLOW IN DENMARK AND SCANDINAVIA

Key words: Salix cinerea subsp. *oleifolia*, systematics, variation, hybridization, distribution, ecology.

Introduktion

Under vores studier af danske og skandinaviske Pile (bidrag til FLORA NORDICA ved KIC og en oversigt over hybridisering i den danske flora ved HN) har vi på flere lokaliteter i Danmark og Sydsverige konstateret en afvigende »Grå-Pil«. Den adskiller sig fra den almindelige Grå-Pil (*Salix cinerea* L. i snæver forstand) i flere karakterer: den er ofte en stor busk ligesom den almindelige Grå-Pil, men kan blive et træ på op til ca. 15 m; barken er furet; både skud og blade er mindre tæt hårede; bladoversiderne er mørkere grønne og ofte blanke; bladundersiderne mister en stor del af hårene med alderen, og flertallet af de tilbageværende hår er rustfarvede (se Fig. 1-4). (Den almindelige Grå-Pil har bladundersider med lysegrå hår).

Denne afvigende »Grå-Pil« er ikke omtalt i danske eller skandinaviske floraværker (Floderus 1931; Grapengiesser 1966; Rostrup & Jørgensen 1979; Lid 1985; Hansen 1991), men benyttes bestemmelsesværker, der dækker Europa eller Nordafrika (Maire 1961; Rechinger 1964; Meikle 1984), må denne for Skandinavien nye »Grå-Pil« henregnes til *S. cinerea* subsp. *oleifolia* (Sm.) Macreight (det samme som *S. atrocinerea* Brot.).

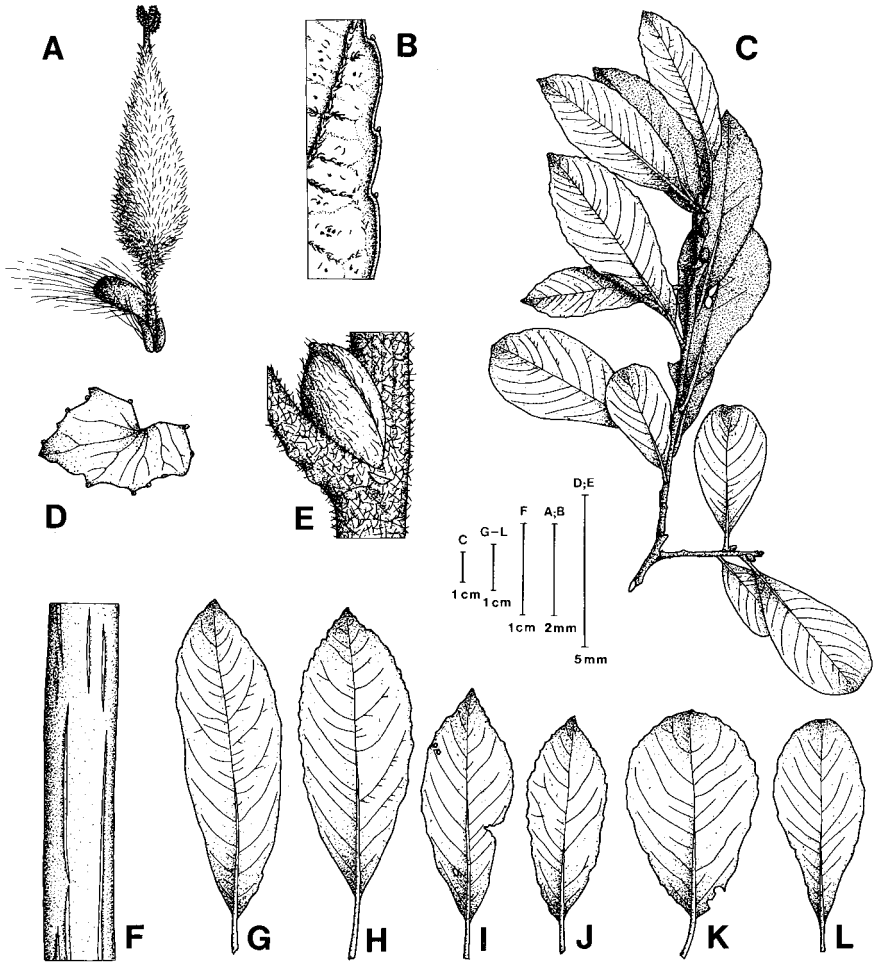

Fig. 1. Rust-pil (*Salix cinerea* subsp. *oleifolia*). **A.** Hunblomst (næsten moden kapsel) med støtteblad (tv.) og nektarium. **B.** Bladunderside og -rand. **C.** Kvist med blade. **D.** Akselblad (fodflig). **E.** Basis af bladstilk, knop og stykke af en ét år gammel kvist. **F.** Afbarket 4 år gammel kvist med ribber. **G-L.** Blade. Baseret på Blom s.n., 14.V. & 9.VII.1952 (A, D, F, G); Christensen 2649 (B, C, E), 2650 (K), 2651 (H), 2654 (J), 2656 (I), 2657 (L). Del.: K.I. Christensen. – Rusty Sallow (*S. cinerea* subsp. *oleifolia*). **A.** Female flower (capsule) with bract (to the left) and nectarium. **B.** Lower surface and margin of leaf blade. **C.** Twig with leaves. **D.** Stipule. **E.**Base of petiole, bud and part of a one year old twig. **F.**Decorticated wood of a four years old twig, with ridges. **G-L.** Leaves. Del.: K.I. Christensen.

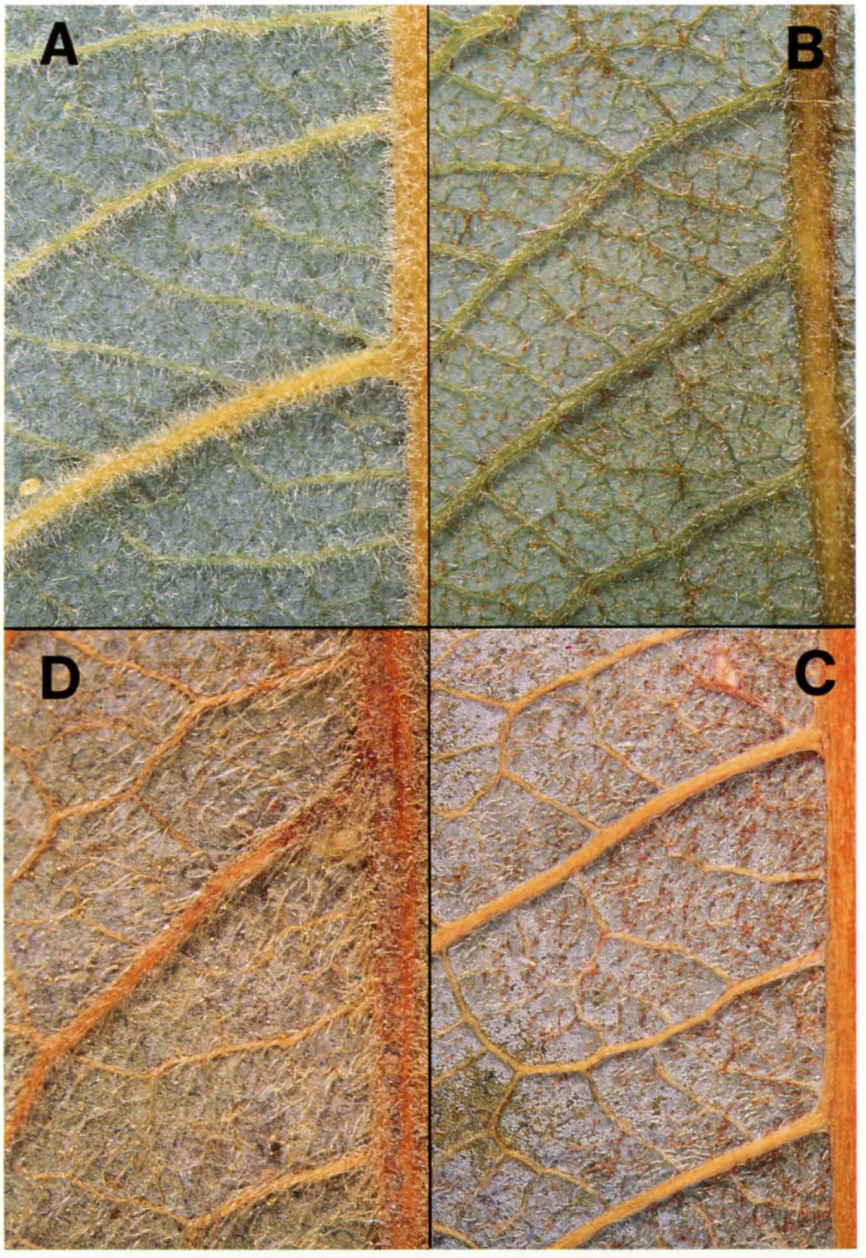

Fig. 2. Nærbilleder af bladundersider hos **A.** Alm. Grå-Pil (*Salix cinerea* subsp. *cinerea*), **B.** Rust-Pil (*S. cinerea* subsp. *oleifolia*), **C.** *S.* ×*laurina* og **D.** Sort Pil (*S. myrsinifolia*). Baseret på indsamlingerne H. Nielsen 1146 (A), A. Hansen s.n., 1.IX. 1963 (B), A.E. Thomsen 22 (C) og J. Baagøe s.n., 17.IX. 1865 (D). Fotos: J. Andersen, Botanisk Museum, Københavns Universitet. – Close-ups of lower leaf surfaces of **A.** Grey Sallow (*S. cinerea* subsp. *cinerea*), **B.** Rusty Sallow (*S. cinerea* subsp. *oleifolia*), **C.** *S.* × *laurina* and **D.** Dark-leaved Willow (*S. myrsinifolia*), Photos: J. Andersen, Botanical Museum, Copenhagen.

Fig. 3. Stammebark af Rust-Pil (*Salix cinerea* subsp. *oleifolia*); største stammediameter ca. 15 cm. Fotograferet af K.I. Christensen i Botanisk Have, København, oprindelse Wales. – Bark of Rusty Sallow (*S. cinerea* subsp. *oleifolia*), origin Wales. Photo: K.I. Christensen.

Taxonomi

Dansk navn: Som dansk navn for *Salix cinerea* subsp. *oleifolia* foreslås her **Rust-Pil**. Det danske navn henviser ligesom det engelske navn »Rusty Sallow« for *S. cinerea* subsp. *oleifolia* til de meget karakteristiske, rustfarvede hår på bladundersiderne.

Grå-Pil i den snævre betydning (*S. cinerea* subsp. *cinerea*) benævnes herefter som »Alm. Grå-Pil« – med dette navn underforstås det, at man betragter Rust-Pil og den »Linnæiske Grå-Pil« som to underarter af samme art. (Hvis Rust-Pil betragtes som artsforskellig fra Alm. Grå-Pil, kan sidstnævnte bare kaldes Grå-Pil.)

Rust-Pil kan altså – afhængigt af hvilken taxonomisk skole, den enkelte systematiker tilhører – behandles enten – 1. som en selvstændig art: *Salix atrocinerea*, der så betragtes som nært beslægtet med Alm. Grå-Pil (Rechinger & Lawalrée 1960; Rechinger 1964; Skvortsov 1968); eller – 2. som et taxon inden for arten Grå-Pil i bred forstand (*S. cinerea* subsp. *oleifolia*, *S. cinerea* var. *oleifolia*) (Gaudin 1830; Sampaio 1908-1909; Guinier 1912; Maire 1961; Meikle 1984).

For at betragte Rust-Pil som en selvstændig art taler f.eks., at for-

skellene mellem arterne Alm. Grå-Pil, Selje-Pil (*S. caprea* L.) og Øret Pil (*S. aurita* L.) ikke er meget mere overbevisende som artskendetegn, end de få forskelle mellem Rust-Pil og Alm. Grå-Pil er. Desuden har Rust-Pil specielle ligheder fælles med hver af disse slægtninge: Rust-Pil og Selje-Pil har nogenlunde samme vækstform, barktype og udseende af bladoversider, mens Rust-Pil og Øret Pil har nogenlunde samme bladform, kvisttykkelse, -bark og -behåring. Baseret på disse ligheder kunne man måske lige så godt have valgt at betragte Rust-Pil som en underart af Selje-Pil eller af Øret Pil, fremfor som en underart af Grå-Pil. Af de specielle ligheder mellem Rust-Pil og Alm. Grå-Pil kan nævnes, at de har kromosomtallet 2n = 76, mens Selje-Pil og Øret Pil har 2n = 36 (Neumann & Polatschek 1972), og at blomsternes nektarier er ca. 1 mm lange hos Rust-Pil og Grå-Pil, mens de hos Sejle-Pil og Øret Pil er ca. 1/2 mm lange. Desuden optræder Rust-Pil som vikarierende taxon for Alm. Grå-Pil i det vestligste Europa og nordvestlige Afrika (se Fig. 4 og 5). I overensstemmelse med KICs behandling af Rust-Pil i FLORA NORDICA 1 betragtes Rust-Pil i denne artikel som en underart af Alm. Grå-Pil med det latinske navn:

Fig. 4. Stammebark af Alm. Grå-Pil (*Salix cinerea* subsp. *cinerea*); største stammediameter ca. 25 cm. Fotograferet af K.I. Christensen i Botanisk Have, København, oprindelse Jægerspris. Bark of Grey Sallow (*S. cinerea* subsp. *cinerea*), origin Zealand, Jægerspris. Photo: K.I. Christensen.

Salix cinerea subsp. oleifolia (Sm.) Macreight
Macreight, Man. Brit. Bot.: 212 (1837).
De vigtigste synonymer er:
S. oleifolia Sm., Fl. Brit.: 1065 (1804), non Vill., Hist. Pl. Dauphiné 3: 784 (1789). *S. cinerea* var. *oleifolia* (Sm.) Gaudin, Fl. Helv. 6: 242 (1830).
S. atrocinerea Brot., Fl. Lusit. 1: 31 (1804). *S. cinerea* var. *atrocinerea* (Brot.) Samp. in Bol. Soc. Brot. 24: 103 (1908-1909). *S. cinerea* subsp. *atrocinerea* (Brot.) Guinier, Atlas des Arbres 9,29: 2 (1912).

Kendetegn, variation og hybridisering
Geografiske underarter er ofte let genkendelige i deres typiske former, men enkeltindivider kan være vanskelige at bestemme. I nogle områder (ofte er det geografiske overgangsområder) kan variationen mellem enkeltindivider være næsten lige så stor som variationen hos hele arten. Dette gælder også for Grå-Pils to underarter. Typisk Rust-Pil kan kendes fra Alm. Grå-Pil på den ofte træagtige vækstform, den furede bark, de mindre hårede 2 år gamle skud, der også har færre ribber under barken, de mindre hårede blade, de blankere og mørkere bladoversider, de talrige rustfarvede hår på bladundersiderne og de mindre og tidligt affaldende fodflige (akselblade) (se Fig. 1-4).

I Sydengland, Belgien og Frankrig, hvor udbredelsesområderne for Alm. Grå-Pil og Rust-Pil overlapper (se Fig. 5 og 6), kendes individer, der er mere eller mindre intermediære mellem Alm. Grå-Pil og Rust-Pil. De henregnes til hybriden *Salix* ×*guinieri* Chassagne & Görz (*S. cinerea* subsp. *cinerea* × subsp. *oleifolia*) (Chassagne & Görz 1931; Rechinger & Lawalrée 1960). Dansk og svensk materiale, der afviger fra Rust-Pil ved at have mere behårede skud og blade, men kun få rustfarvede hår på bladundersiderne, repræsenterer formentlig en sådan hybrid mellem Alm. Grå-Pil og Rust-Pil. Desuden findes nogle indsamlinger, som vi indtil videre formoder tilhører krydsningen imellem Rust-Pil og Øret Pil, samt nogle ganske få indsamlinger, der muligvis er krydsningen mellem Rust-Pil og Selje-Pil. Dette kræver dog en nærmere undersøgelse.

Den bedste karakter til at kende Rust-Pil fra andre Pile er tilsyneladende, at størstedelen af bladundersidens hår er rustfarvede. I Skandinavien kan Rust-Pil forveksles med *S.* ×*laurina* Sm. (muligvis *S. cinerea* × *S. bicolor* Ehrh.) og med Sort Pil (*S. myrsinifolia* Salisb. eller *S. nigricans* Sm.), der begge også kan have rustfarvede hår på bladundersiderne (se Fig. 2). Disse hår er imidlertid rette, mens hårene hos Rust-Pil er mere eller mindre krøllede.

Den sjældent plantede *Salix* ×*laurina* afviger fra Rust-Pil ved at have bladundersider med mindre tæt behåring af tilliggende, fremadrettede, rustfarvede hår, ved at have blegt blågrå til næsten hvide bladundersider

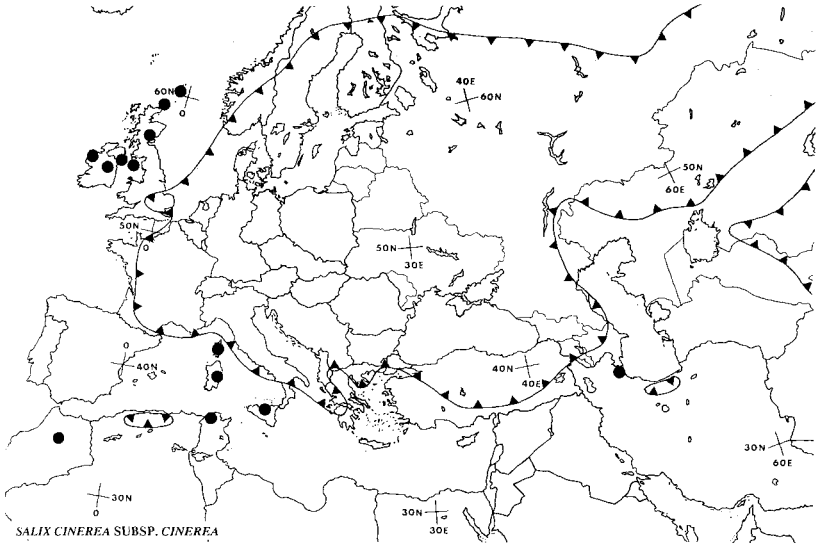

Fig. 5. Den vestlige del af det naturlige udbredelsesområde for Alm. Grå-Pil (*Salix cinerea* subsp. *cinerea*; incl. *S. pseudomedemii* Wolf) (efter Maire 1961, Skvortsov 1968; Jalas & Suominen 1976; Meikle 1984; Hultén & Fries 1986; Boratynski & al. 1990; Browicz & Zielinski 1990). – W part of the natural range of Grey Sallow (*Salix cinerea* subsp. *cinerea*).

(Rust-Pil's bladundersider er grønlige til blågrå) samt ved at griflen er så lang som eller længere end støvfangene (manglende eller kortere end støvfangene hos Rust-Pil). *Salix* ×*laurina* kan imidlertid ligne Rust-Pil særdeles meget, og det kan formodes, at den er opstået som en krydsning med Rust-Pil som den ene forældreart – den anden er muligvis Tofarvet Pil (*S. bicolor*) eller en af dennes nære slægtninge inden for *S. phylicifolia* artsgruppen.

Den yderst variable Sort Pil kan afvige på mange måder fra Rust-Pil; f.eks. ved altid at have rakler samtidig med bladene (Rust-Pil blomstrer inden løvspring), ved oftest at mangle længdegående ribber under barken på de 2-4 år gamle skud, ved ofte at have tæt hårede 1-2 år gamle skud, ved at bladene allerede som unge kan være næsten glatte eller ved at bladene har rette, rustfarvede hår, ved at akselbladene ofte er blivende, samt ved ofte at have glat eller kun stedvis håret frugtknude og frugt (Rust-Pils frugtknuder og frugter er altid hårede).

Talrige, rustfarvede hår kan forekomme på bladoversiderne hos både Øret Pil og Selje-Pil; som regel dog kun på de unge blade. Disse arter har dog aldrig talrige, rustfarvede hår på bladundersiderne. Sommetider kan man imidlertid finde nogle ganske få, rustfarvede hår på bladundersi-

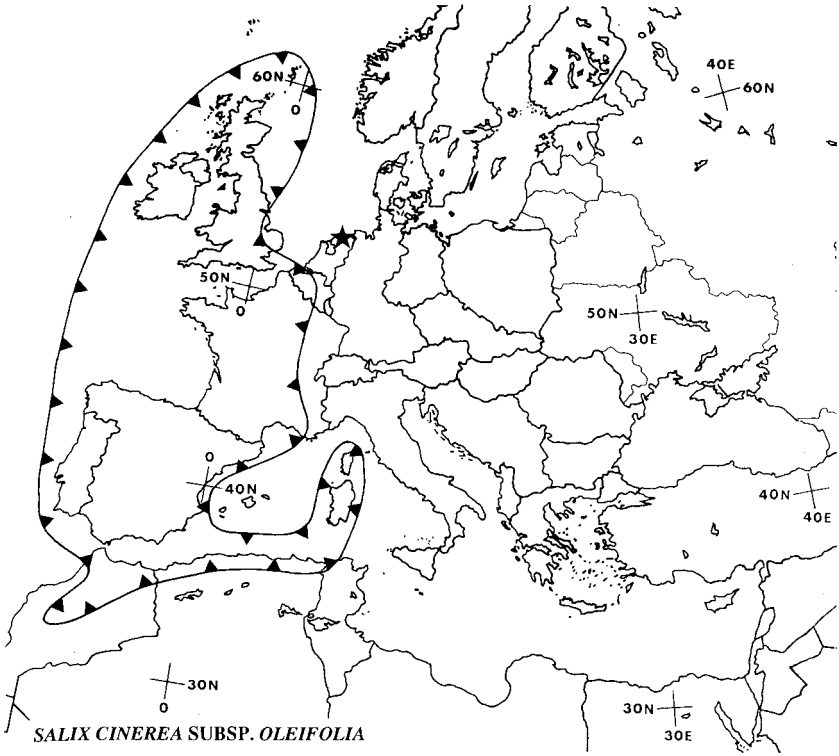

Fig. 6. Det naturlige udbredelsesområde for Rust-Pil (*Salix cinerea* subsp. *oleifolia*) (efter Skvortsov 1968; Mennema & Ooststroom 1975; Jalas & Suominen 1976; Hultén & Fries 1986). – The natural distribution of Rusty Sallow (*S. cinerea* subsp. *oleifolia*).

derne hos (tilsyneladende) Øret Pil, Selje-Pil og Alm. Grå-Pil. Hvis andre karakterer tyder i samme retning formoder vi, at sådanne individer kan regnes for krydsninger med Rust-Pil.

Udbredelse

Alm. Grå-Pil forekommer fra Skandinavien, Sydengland, Irland, Italien og Nordvestafrika til Sibirien og Centralasien (se Fig. 5), hvor den nøjagtige lokalisering af sydgrænsen endnu er usikker. Alm. Grå-Pil kendes desuden som plantet og naturaliseret fra det sydøstlige USA (Argus 1986) og fra Nova Scotia i Canada (Hultén & Fries 1986).

Det naturlige udbredelsesområde for Rust-Pil omfatter Nordvestafrika, Spanien, Portugal, Korsika, Sardinien, Frankrig, Storbritannien, Irland, Belgien og angiveligt mindst een lokalitet i Holland (se Fig. 6). Rust-Pil kendes som plantet og naturaliseret i North Carolina i det sydøstlige USA (Argus 1986). Den er formentlig også plantet i Mellemeuropa, øst for det

naturlige udbredelsesområde – vi har set en enkelt indsamling fra så langt østpå som Rumænien. Ifølge T. Leivsson, Skógrøkt Landsins, Torshavn (pers. comm.), forhandles Rust-Pil i færøske planteskoler. I Skandinavien er Rust-Pil kendt som plantet eller forvildet fra følgende lokaliteter (bogstavforkortelserne efter indsamlingsnummer eller -dato angiver i hvilket botanisk museum, det pågældende materiale findes; forkortelserne følger Holmgren & al. 1990) (se Fig. 7):

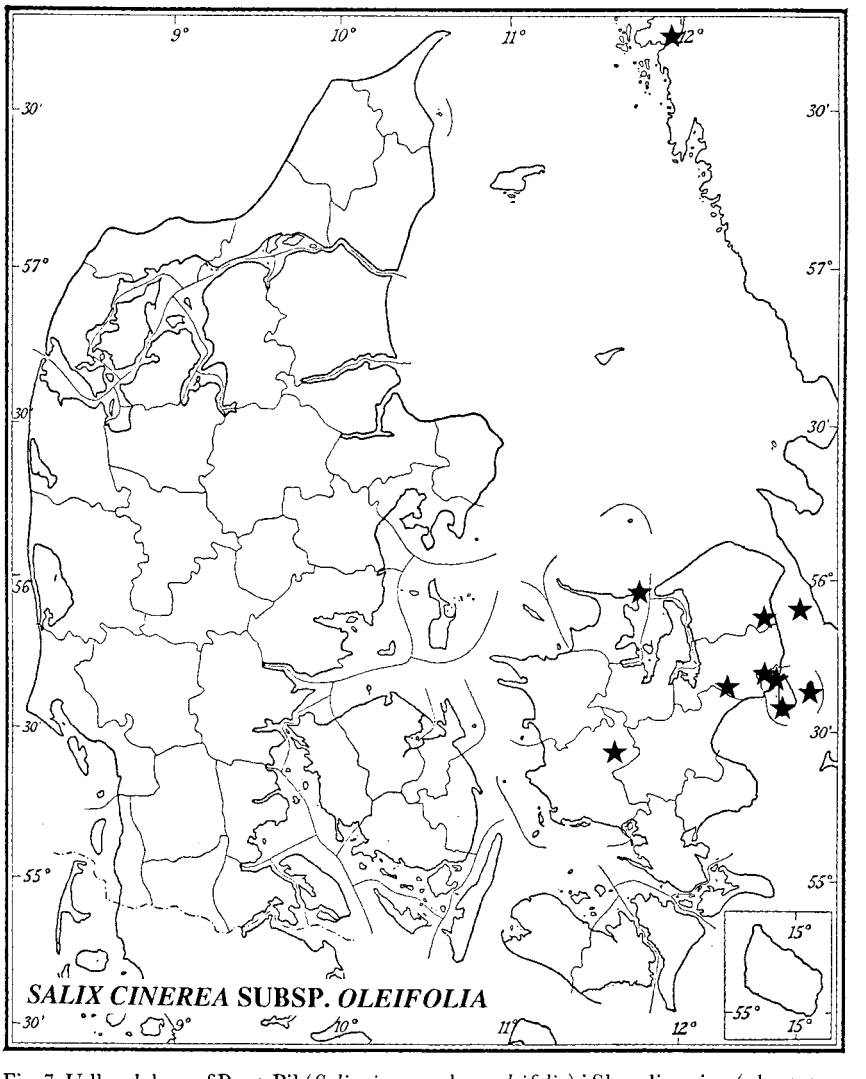

Fig. 7. Udbredelsen af Rust-Pil (*Salix cinerea* subsp. *oleifolia*) i Skandinavien (plantet og forvildet). – The distribution of Rusty Sallow (*S. cinerea* subsp. *oleifolia*) in Scandinavia (planted and escaped).

Danmark

1. TBU Distr. nr. 41, Sjælland, Sorø Sønderskov, arboretet ved Kristiansminde, Københavns Universitets feltstation.
   (K.I. Christensen 2649 (= Th. Sørensen 1952-414), C; oprindelse: Gunnicamp. K.I. Christensen 2650 (= Th. Sørensen 2553), C; oprindelse: Wales, Benton Wood. K.I. Christensen 2651 (=Th. Sørensen 2558), C; oprindelse: Wales, Duffryn. K.I. Christensen 2652 (= Th. Sørensen 2567), C; oprindelse: Wales, Harlich Dunesto. K.I. Christensen 2653 (= Th. Sørensen 21883), C; oprindelse: England, Bugle, Ninest. K.I. Christensen 2654 (= Th. Sørensen 21933), C; oprindelse: England, Lyndhurst-W. K.I. Christensen 2656 (= Th. Sørensen 2561), C; oprindelse: Wales. K.I. Christensen 2657 (= Th. Sørensen 2562), C; oprindelse: Wales.)
2. TBU Distr. nr. 43, Sjælland, Langesø Mose ved Rørvig (N. Jacobsen 2629, 2634 (= N. Jacobsen 2629), Botanisk Laboratoriums herbarium). Sandsynligvis forvildet. Oprindeligt bestemt som Alm. Grå-Pil.
3. TBU Distr. Nr. 45a, Sjælland, Højbakkegård, Tåstrup, plantet. (H. Nielsen 91-2058, C).
4. TBU Distr. nr. 45b, Sjælland, Forskningscentret, Hørsholm, plantet Pilekrat. (K.I. Christensen 2638 (= Th. Sørensen 20566), C). Sørensen 20566 er angiveligt samlet i TBU. Distr. nr. 20, Jylland; nemlig i »Højlund Skov, nær den sydvestlige bred, mosen«; men materialet plantet ved Forskningscentret i Hørsholm er ikke identisk med materialet plantet i Københavns Universitets arboret ved Kristiansminde i Sorø Sønderskov under det samme Th. Sørensen nummer. Dette er nemlig Øret Pil; så det er tvivlsomt om Rust-Pil findes i mosen ved Højlund Skov.
5. TBU Distr. nr. 46, Amager, Kongelunden, fugtig blandskov (K.I. Christensen 2621, 2622, 2624 til 2629, 2631, 2632, C; H. Nielsen s.n., 10. VIII. 1988, (bestemt som Rust-Pil under Hovedstadsrådets undersøgelse af vegetation på stendiger og jordvolde i hovedstadsregionen) C; H. Nielsen s.n., 15. IX. 1990, C; H. Nielsen 91-1950 og 91-2083 til 91-2087, C).
6. TBU Distr. nr. 46, Amager, ca. 0.5 km N for Kongelunden, tør rørsump lige øst for Kongelundsvej, et lille træ, formentlig selvsået (H. Nielsen 91-2091, C).
7. TBU Distr. nr. 46, Saltholm, »Lunden«, plantet (A. Hansen s.n., 1. IX. 1963, C). Oprindeligt bestemt som Alm. Grå-Pil.
8. TBU Distr. nr. 46, Sjælland, Utterslev Mose, ved Maglegårds Allé (N. Jacobsen & K. Vollesen 2387, C. N. Jacobsen 2588 (= N. Jacobsen 2387), C). Oprindelig bestemt som Øret Pil.
9. TBU Distr. nr. 46, Sjælland, Tingbjerg, Gyngemosen ved kommunegrænsen til Mørkhøj, pilekrat (H. Nielsen 91-1800, 91-1802, 91-1803, C).
10. TBU Distr. nr. 46, Sjælland, København, Botanisk Have (Anon. s.n., IX. 1971; Botanisk Laboratoriums herbarium).

Sverige

11. Hven, Olanders tegelbruk, i opgivet lergrav (A. Nilsson s.n., 26.VI. 1950, AAU). Oprindeligt bestemt som *Salix aurita x S. cinerea.*
12. Göteborg, plantet (C. Blom s.n., 14.V. & 9.VII. 1952, AAU). Oprindeligt bestemt som *Salix aurita x S. cinerea x S. purpurea.*
13. Göteborg, nær Lärje Banegård (C. Blom 6025, C). Oprindelig bestemt som *Salix aurita x S. purpurea x S. repens.*

Økologi

Rust-Pil forekommer i et bredt spektrum af levesteder. Den findes på såvel sur som basisk jordbund, f.eks. langs flodbredder, i kanten af moser og enge, i fugtige skovbryn og i hegn; kun på de mest sure jorder erstattes den af Øret Pil (Meikle 1984).

Rust-Pil forekommer fra 0-600 m over havet i Storbritannien til ca. 2400 m over havet i Nordafrika (Maire 1961; Meikle 1984). Alm. Grå-Pil

forekommer fra havniveau til 2100 m i Grækenland og op til ca. 2500 m i Tyrkiet (Boratynski et al. 1990, Browicz & Zielinski 1990).

Alm. Grå-Pil har en videre geografisk udbredelse end Rust-Pil (se fig. 5 og 6), men til gengæld en snævrere økologisk amplitude – dvs. den stiller større krav til levested. Jordbunden *skal* være tørveholdig (Hegi 1981), men gerne opblandet med mineraljord, eller i det mindste gennemstrømmet af næringsholdigt grundvand. Den forekommer *kun* på fugtige steder, f.eks. ved søbredder, i moser og kær, i rørsump og ved grøfter, mergel- og tørvegrave. Den findes dog hverken i højmoser eller i ekstrem-fattigkær, hvor tørvens næringsindhold åbenbart er for ringe.

Alm. Grå-Pil er i højere grad end de fleste andre Pile en pionérplante. Den er i etableringsfasen knyttet til lokaliteter, som naturligt eller gennem kulturpåvirkning er fri for et sluttet vegetationsdække (Nilsson 1930). I en periode vil Alm. Grå-Pil kunne danne et tæt krat, f.eks. i tilgroende moser, men med stigende udtørring vil andre arter af træer og buske som f.eks. Alm. Røn, Tjørne-arter og Selje-Pil kunne indvandre og fortrænge Alm. Grå-Pil.

SUMMARY

Rusty Sallow (*Salix cinerea* L. subsp. *oleifolia* (Sm.) Macreight or *S. atrocinerea* Brot.) is here reported for the first time from Denmark and Sweden (Fig. 7). Rusty Sallow is planted (or presumed to have been planted) in most of the known localities of Denmark and Sweden, but at least in one locality, c. 0.5 km N of the forest of Kongelunden, the island of Amager, it grows as an escape. A nearby stand (a row of old trees) in the forest of Kongelunden is presumably planted. A Danish vernacular name is proposed for the first time. i.e. *Rust-Pil* (= Rusty Sallow in English). Rusty Sallow is illustrated (Figs. 1-3), and its relationships to Grey Sallow (*S. cinerea* L. s.str.), Eared Willow (*S. aurita* L.) and Goat Willow (*S. caprea* L.) are discussed, as well as its diagnostic characters, variation, ecology, distribution (Figs. 5-6) and the occurrence of putative hybrids.

Danmark

1. TBU Distr. nr. 41, Sjælland, Sorø Sønderskov, arboretet ved Kristiansminde, Københavns Universitets feltstation.
   (K.I. Christensen 2649 (= Th. Sørensen 1952-414), C; oprindelse: Gunnicamp. K.I. Christensen 2650 (= Th. Sørensen 2553), C; oprindelse: Wales, Benton Wood. K.I. Christensen 2651 (=Th. Sørensen 2558), C; oprindelse: Wales, Duffryn. K.I. Christensen 2652 (= Th. Sørensen 2567), C; oprindelse: Wales, Harlich Dunesto. K.I. Christensen 2653 (= Th. Sørensen 21883), C; oprindelse: England, Bugle, Ninest. K.I. Christensen 2654 (= Th. Sørensen 21933), C; oprindelse: England, Lyndhurst-W. K.I. Christensen 2656 (= Th. Sørensen 2561), C; oprindelse: Wales. K.I. Christensen 2657 (= Th. Sørensen 2562), C; oprindelse: Wales.)
2. TBU Distr. nr. 43, Sjælland, Langesø Mose ved Rørvig (N. Jacobsen 2629, 2634 (= N. Jacobsen 2629), Botanisk Laboratoriums herbarium). Sandsynligvis forvildet. Oprindeligt bestemt som Alm. Grå-Pil.
3. TBU Distr. Nr. 45a, Sjælland, Højbakkegård, Tåstrup, plantet. (H. Nielsen 91-2058, C).
4. TBU Distr. nr. 45b, Sjælland, Forskningscentret, Hørsholm, plantet Pilekrat. (K.I. Christensen 2638 (= Th. Sørensen 20566), C). Sørensen 20566 er angiveligt samlet i TBU. Distr. nr. 20, Jylland; nemlig i »Højlund Skov, nær den sydvestlige bred, mosen«; men materialet plantet ved Forskningscentret i Hørsholm er ikke identisk med materialet plantet i Københavns Universitets arboret ved Kristiansminde i Sorø Sønderskov under det samme Th. Sørensen nummer. Dette er nemlig Øret Pil; så det er tvivlsomt om Rust-Pil findes i mosen ved Højlund Skov.
5. TBU Distr. nr. 46, Amager, Kongelunden, fugtig blandskov (K.I. Christensen 2621, 2622, 2624 til 2629, 2631, 2632, C; H. Nielsen s.n., 10. VIII. 1988, (bestemt som Rust-Pil under Hovedstadsrådets undersøgelse af vegetation på stendiger og jordvolde i hovedstadsregionen) C; H. Nielsen s.n., 15. IX. 1990, C; H. Nielsen 91-1950 og 91-2083 til 91-2087, C).
6. TBU Distr. nr. 46, Amager, ca. 0.5 km N for Kongelunden, tør rørsump lige øst for Kongelundsvej, et lille træ, formentlig selvsået (H. Nielsen 91-2091, C).
7. TBU Distr. nr. 46, Saltholm, »Lunden«, plantet (A. Hansen s.n., 1. IX. 1963, C). Oprindeligt bestemt som Alm. Grå-Pil.
8. TBU Distr. nr. 46, Sjælland, Utterslev Mose, ved Maglegårds Allé (N. Jacobsen & K. Vollesen 2387, C. N. Jacobsen 2588 (= N. Jacobsen 2387), C). Oprindelig bestemt som Øret Pil.
9. TBU Distr. nr. 46, Sjælland, Tingbjerg, Gyngemosen ved kommunegrænsen til Mørkhøj, pilekrat (H. Nielsen 91-1800, 91-1802, 91-1803, C).
10. TBU Distr. nr. 46, Sjælland, København, Botanisk Have (Anon. s.n., IX. 1971; Botanisk Laboratoriums herbarium).

Sverige

11. Hven, Olanders tegelbruk, i opgivet lergrav (A. Nilsson s.n., 26.VI. 1950, AAU). Oprindeligt bestemt som *Salix aurita x S. cinerea.*
12. Göteborg, plantet (C. Blom s.n., 14.V. & 9.VII. 1952, AAU). Oprindeligt bestemt som *Salix aurita x S. cinerea x S. purpurea.*
13. Göteborg, nær Lärje Banegård (C. Blom 6025, C). Oprindelig bestemt som *Salix aurita x S. purpurea x S. repens.*

Økologi

Rust-Pil forekommer i et bredt spektrum af levesteder. Den findes på såvel sur som basisk jordbund, f.eks. langs flodbredder, i kanten af moser og enge, i fugtige skovbryn og i hegn; kun på de mest sure jorder erstattes den af Øret Pil (Meikle 1984).

Rust-Pil forekommer fra 0-600 m over havet i Storbritannien til ca. 2400 m over havet i Nordafrika (Maire 1961; Meikle 1984). Alm. Grå-Pil

forekommer fra havniveau til 2100 m i Grækenland og op til ca. 2500 m i Tyrkiet (Boratynski et al. 1990, Browicz & Zielinski 1990).

Alm. Grå-Pil har en videre geografisk udbredelse end Rust-Pil (se fig. 5 og 6), men til gengæld en snævrere økologisk amplitude – dvs. den stiller større krav til levested. Jordbunden *skal* være tørveholdig (Hegi 1981), men gerne opblandet med mineraljord, eller i det mindste gennemstrømmet af næringsholdigt grundvand. Den forekommer *kun* på fugtige steder, f.eks. ved søbredder, i moser og kær, i rørsump og ved grøfter, mergel- og tørvegrave. Den findes dog hverken i højmoser eller i ekstrem-fattigkær, hvor tørvens næringsindhold åbenbart er for ringe.

Alm. Grå-Pil er i højere grad end de fleste andre Pile en pionérplante. Den er i etableringsfasen knyttet til lokaliteter, som naturligt eller gennem kulturpåvirkning er fri for et sluttet vegetationsdække (Nilsson 1930). I en periode vil Alm. Grå-Pil kunne danne et tæt krat, f.eks. i tilgroende moser, men med stigende udtørring vil andre arter af træer og buske som f.eks. Alm. Røn, Tjørne-arter og Selje-Pil kunne indvandre og fortrænge Alm. Grå-Pil.

SUMMARY

Rusty Sallow (*Salix cinerea* L. subsp. *oleifolia* (Sm.) Macreight or *S. atrocinerea* Brot.) is here reported for the first time from Denmark and Sweden (Fig. 7). Rusty Sallow is planted (or presumed to have been planted) in most of the known localities of Denmark and Sweden, but at least in one locality, c. 0.5 km N of the forest of Kongelunden, the island of Amager, it grows as an escape. A nearby stand (a row of old trees) in the forest of Kongelunden is presumably planted. A Danish vernacular name is proposed for the first time. i.e. *Rust-Pil* (= Rusty Sallow in English). Rusty Sallow is illustrated (Figs. 1-3), and its relationships to Grey Sallow (*S. cinerea* L. s.str.), Eared Willow (*S. aurita* L.) and Goat Willow (*S. caprea* L.) are discussed, as well as its diagnostic characters, variation, ecology, distribution (Figs. 5-6) and the occurrence of putative hybrids.

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Fig. 1. The prince of Choni and Joseph F. Rock. 1925. Joseph F. Rock, © National Geographic Society.

FROM GANSU TO KOLDING THE EXPEDITION OF J.F. ROCK IN 1925-1927 AND THE PLANTS RAISED BY AKSEL OLSEN

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Fra Gansu til Kolding
J.F. Rocks ekspedition i 1925-1927
– og planterne derfra dyrket af Aksel Olsen.

Key words: Plantdiscovery, NW China, Minshan, Amnye Machen, Aksel Olsen, Joseph Rock.

Preface

The object of this project has been to call attention to the valuable work that was the life of two men- J. F. Rock and Aksel Olsen. Rock collected plants in Western China and Eastern Tibet from 1921-1949, and Olsen grew them in his nursery, "Brændkjærhøj," from 1917-1982. The incredible output of these two men could keep students of botany and horticulture busy for years, for in fact only a very few men and women have studied Aksel Olsen's work in Scandinavia, except perhaps for his many students who came to know him well, learn by his example, be inspired by his curiosity and practice his precepts. Among Danish botanists, Olaf Olsen, and Johan Lange are practically the only men of their profession to study in detail the contribution Aksel Olsen has made to horticulture in Scandinavia.

Joseph Rock's name is nowadays known to some botanists and a few plant enthusiasts, mostly for a minority of the plants he collected, such as the rhododendrons from especially his last expedition for the American Rhododendron Society in 1948-1949, and for the attractive rowan of uncertain origin, *Sorbus* 'Joseph Rock.' In his day, Rock was known as a determined and efficient collector with a discriminating eye for plants of good form, and as a very thorough scholar of Asian anthropology and ethnology. His expedition to Gansu and Qinghai provinces from 1925-

1927 yielded a large number of hardy and useful plants, collected from one of China's more barren areas. Immediately following the completion of Rock's expedition, botanists at the Arnold Arboretum in Boston (the sponsor of the expedition) went to work determining the results. Yet it is now, six decades after Rock made it back without the loss of a single specimen, that we can see which plants have been of the greatest use horticulturally. And from a botanical standpoint, the results of Rock's collections will never lose their importance.

The enthusiasm and curiosity with which Rock's plants were met before, have in our day yielded to a kind of indifference that borders on ignorance. Rock's plants lead an undeserved anonymous existence in most of the botanical gardens where they were introduced. And as for Olsen's work-gardeners discover almost every day (sometimes in an almost rapt fashion) the beauty and delight that Aksel Olsen saw in such kindrid spirits. By today's standards of nursery practice, his kind of broad-mindedness is anathema, but he was a born innovator, and never afraid of exploring the possibilities that lay in a new plant, method, or discovery.

Introduction

I have chosen in this project to attempt to take as large a survey as possible of the state of Rock's collections in various Scandinavian collections. Some of these (such as the Bergius Botanic Garden, Stockholm and the Botanic Garden, Copenhagen) were the primary source of the seed from Rock's expedition, since they were recipients of the Arnold Arboretum's distribution to botanical institutions across Northern Europe in 1926 and 1927. In addition to this survey, I have attempted wherever possible to ascertain the origin of the plants attributed to Rock. During the years most of the growers have either thrown out the original numbers assigned by Rock to his specimens, or they have neglected to follow through with keeping records up to date. Luckily at the Botanic Garden, Copenhagen, the record of what was received, sown, distributed, grown, or replaced is fairly precise. Although it is quite certain that there are more of Rock's plants growing in the various collections than are attributed to him, the general consensus has been to maintain the Rock identity only when it can be established beyond a doubt.

As for secondary sources, only rare circumstances of exceptionally good memory or good record keeping allow for the same degree of certainty excercised by the other growers. This information on the origin of the plants discussed is found in the text concerning the specific plant groups, and in the appendices at the end of the text. Through the cooperation of many individuals it has sometimes been possible to link the sale or purchase of a plant with its existence in a collection today.

In addition to the material concerning the existence and origin of

Rock's plants in Scandinavian collections, there is also material on the geography, ecology, and climate of the area in China where Rock collected. It is important to remark here that in the usage of place names I have retained those which Rock used, and where necessary or helpful, I have added the present day equivalent.

Lastly, I have written a section on Rock and Olsen and briefly on plant exploration in China in Rock's day to help orient the reader and to aquaint him with some of the interesting details of the lives of these two men.

Acknowledgements

The nature of this project has made it a necessity to enlist the help of other people.

I am most grateful to two dendrologists: my advisor, Mr. Kenneth Lorentzon, Swedish University of Agricultural Sciences, Alnarp, and director Søren Ødum, Royal Veterinary and Agricultural University, Arboretum, Hørsholm.

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Mr. Bertil Hylmö provided me with information on especially the *Rosaceae* collected by Rock.

Mr. N. D. Poulsen, D. T. Poulsens Nursery, Fredensborg, and Mr. Arne Vagn Jacobsen, Glamsbjerg, Fyn, took stock of Rock's plants in their nurseries.

To Mr. Roy Lancaster, Hampshire, England, I am grateful for giving me a nudge in the right direction concerning source material in the United Kingdom and for valuable comments on the present state of affairs in the Min Shan area of China.

Dr. Michael Stieber of the Morton Arboretum in Lisle, Illinois, supplied information on Rock and on the plants extant in the Arboretum from Rock's expeditions. I thank Dr. Herbert Spady of the Portland Chapter of the American Rhododendron Society, and Mr. Richard Piacentini of the Rhododendron Species Foundation, for their help concerning Rock's collections from that genus.

To all those in charge of the curatorship of botanical gardens and arboreta in Denmark and Sweden who took time to painstakingly check the records of Rock's plants in their collections and send this information to me, I am most thankful. Included here are: Henni Wanntorp, Bergius Botanic Garden, Stockholm; Poul Søndergård, Forstbotanisk Have, Charlottenlund, and Find Günther Christensen, the Arboretum, Hørs-

holm; Mr. Bruun Madsen, Forstbotanisk Have, Århus. Mr. Folmer Arnklit, the Botanic Garden, Copenhagen, provided critical information on the history behind Rock's introductions in Denmark and their spread to other botanical institutions and nurserymen.

Dr. Knud Ib Christensen, the Arboretum, Hørsholm, gave valuable and generous help in matters taxonomical.

I am grateful to the librarians of the Swedish University of Agricultural Sciences, Alnarp, the SLU library, Skogsbiblioteket, Umeå, the library of Botanical Museum, University of Lund, Botanical Library, Copenhagen, the library of the Royal Botanic Gardens, Kew, and of the library, Botanic Gardens, Edinburgh.

Mr. Colin Will, Edinburgh, kindly provided me with an excellent annotated biography of Rock's archive.

The text has improved thanks to Sten Porse, Horticultural College, Beder, and Mr. Don DuPree, University of the South, Sewanee, Tennessee.

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The excellent photographs of the trees in the Arboretum, Hørsholm, are the work of Helge Vedel, to whom I am indebted.

And the final word of thanks for this project goes to Anna Thora Olsen, Aksel Olsen's Nursery, "Brændkjærhøj," Kolding. Her warm hospitality on several cold Danish winter nights, her excellent memory and her vivid portrait of her father and stories of life on his nursery, which she singlehandedly carries on, were all a great inspiration. She also kindly loaned essential and irreplaceable source material on both Rock and her father, and gave permission to use the illustrations from his hand in the text, for which it is substantially more interesting.

All these people, and a number of others that lack of space prohibits me from mentioning have helped in countless ways with this project.

Prologue

This project brings together the work of two contemporary men: J.F.C. Rock, American linguist, botanist, plant explorer, and Aksel Olsen, Danish nurseryman, author, artist. Rock risked the dangers and hardships of life in China for 30 years, collecting plants and studying native tribes. Olsen established and ran a nursery for 65 years, which became renowned as a much sought after place of learning for horticultural students, botanists, and gardeners. Olsen had a lifelong interest in China that was stimulated by Rock and his colleagues. He went to great lengths to secure seed from the China expeditions, grow the resulting plants to saleable size,

and write informatively about those plants for the gardening public.

The plants collected by Rock, and grown by Olsen, have stimulated generations of horticulturalists to take an interest in and a responsibility for their environment, both in the garden and abroad.

China

From Marco Polo's journey in the latter 13th century until the mid 19th century, China was an exotic and little-known land. A long succession of Chinese dynasties controlled access to the interior with severity. Not until after the Opium Wars in 1836 and 1856 and the aftermath of the Boxer Rebellion in 1900, did the West finally force its way into China.

The Russians already had a foothold in the north and explored Manchuria, Mongolia, Turkestan, and the interior provinces in detail. To the south the British were concerned to keep their empire strong, making tentative efforts to secure Tibet as a bulwark. The French had a strong colony in Indochina and pressed into southwest China with a railroad to Kunming. The Americans finally made their presence felt, encouraged by their efforts with Japan. Soon the Yangtze River was a busy highway with boats of almost every western nationality, and missionaries of every Christian sect were deep in the interior preaching to the most impervious of natives.

Within the space of fifty years explorers made amazing journeys: from Beijing to Lhasa and on into Burma, and from Turkestan to Indochina, and up and down all the major rivers of China. That politics got mixed up with exploration was inevitable, given the circumstances. The Russians were almost all military officers to a man, and everyone was wary of each other. The Dalai Lama had even announced that Queen Victoria was the evil reincarnation of a demon goddess who slew and flayed her own son and spread disease through the world (Rock, 1928). The Chinese were beleagured on all sides and were busy most of the time playing both ends against the middle.

In botany and horticulture all kinds of new trees, shrubs, alpines, and perennials swelled the herbaria and botanical gardens of America and Europe. Scientific institutions from Boston to St. Petersburg were soon sorting out all the new discoveries. Nurseries and botanic gardens became engaged in a lively trade with Chinese plants, and they sent scores of explorers out to find more. The incredible richness of China's flora began to give botanists an idea of the world's past and present flora. And until quite recently everything that came into the West from before 1949 has been the basis of its knowledge and appreciation of this varied land.

By 1920, when Joseph Rock at the age of 36 began to explore and collect in China, a long succession of plant hunters had preceeded him. There were no less than 10 major British collectors in the field within the space of 25 years, 10 Frenchmen, many of them missionary – naturalists, 11 Russians, 3 Americans, in addition to Belgian, German, Austrian, Italian, and Swedish collectors.

J. F. C. Rock

Josef Franz Karl Rock was born in Vienna in 1884. He had an extraordinary gift for languages; he began teaching himself Chinese at the age of 15. In addition, he also spoke fluent German, Hungarian, English, Italian, Greek, Latin, Spanish, French, Icelandic, and had as well an understanding of Arabic and the languages of southwest China's indigenous tribes. He left home at the age of 19 and landed on Hawaii in 1907, after a half year washing dishes in New York City, and a half year in Waco, Texas, at Baylor University learning English and studying religion. In the course of his 13 years on Hawaii he taught himself botany, collected widely on the islands, established what later became the University of Hawaii's (Bishop Museum's) herbarium, (amassing over 29,000 sheets), became the first curator of the Botanic Garden, and was appointed professor of systematic botany and of Chinese. He started a series of publications, wrote over 29 articles in botanical magazines and 2 major books on the indigenous woody flora, as well as 3 major monographs on specific families. His efforts to study systematically and publish on the flora of Hawaii earned him the title "Father of Hawaiian Botany" after W. Hillebrand in Berlin. Rock also saved Hillebrand's herbarium by taking duplicates and fragments of his types during a world tour of herbaria in 1914. It was destroyed in the bombing of Berlin in 1943 (Chock, 1963: pp. 91-92).

Rock left Hawaii in 1920, and began his career as explorer, geographer, plant hunter, and anthropologist. (Fig.1). During the first 20 years, he collected for various institutions; as for example the United States Department of Agriculture. His first trip for them was after seeds of the Chaulamoogra tree, *Taraktogenos kurzii,* which were the basis for a plantation on Hawaii used in the treatment of leprosy. From 1921-1934 he made several expeditions in Yunnan and Sichuan for the National Geographic Society, the Smithsonian Institute, and in Quighai and Gansu Provinces for the Arnold Arboretum and the Natural History Museum of Harvard. These expeditions resulted in well over 100,000 herbarium sheets, seed of thousands of plants, photographs, and birdskins. He had much of the "Intrepid Explorer" about him and, for the National Geographic Society, an exasperating habit of overestimating the elevations of Chinese mountains.

Fig 2. "After pitching camp on the southern shore of the Koko Nor, the author's (J.F. Rock) party took a chilly swim". Joseph F. Rock, © National Geographical Society.

He wrote a number of articles for them in an informative and dramatic style, illustrated with his own photographs which earned him a reputation as an excellent photographer. (Fig.2). Their titles belie his style: "Experiences of a Lone Geographer, An American Agricultural Explorer Makes his Way through Brigand-Infeted Central China en route to the Amnyi Machen Range in Tibet" and "Seeking the Mountains of Mystery, an Expedition on the China-Tibet Frontier to the Unexplored Amnyi Machen Range, One of Whose Peaks Rivals Everest." (It fell short by nearly 2300 metres).

He maintained an extravagant style in the field. He had a private cook, even trained in Austrian dishes who prepared meals in advance of the main guard whenever possible – complete with linen, crystal, silver, and porcelain. Rock also carried a collapsible bathtub, grammophone, tents, chairs, tables, tinned food, as well as his plant presses, medicines, photographic and surveying equipment, guns, and ammunition. All of this impedimenta kept scores of muleteers, mules, yaks, horses, camels, coolies, and armed soldiers busy for days. He was called "the foreign Prince" by the Yunnanese, among whom he lived for most of his years in China. He had a sensitive nose and an observant eye for everything around him, especially objects of quality and good workmanship. In his notebooks he kept track not only of plant, and animal specimens but also landmarks,

compass bearings, and elevations. All of this was of sufficient interest for the CIA to keep copies of Rock's fieldnotes, which it did with his permission (Sutton, 1974: p. 105).

Rock went straight to the sources of power to accomplish his aims – be they princes, tribal chiefs, magistrates, officers, or bandits. During the last 15 years of his life in China, Rock concentrated on his anthropological studies of the Nakhi tribe in Yunnan. This was the tribe from which he picked his own escort of trained collectors. He transcribed their ancient religious ceremonies and writings and compiled a dictionary and many more books in several volumes. His work was made difficult by antagonism from the Communist Chinese towards foreigners and the Second World War. During the war Rock lost 12 years of research when Japanese bombs destroyed a press in Shanghai and Japanese torpedoes sunk a freighter in the Indian Ocean (Chock, 1963: p. 95). After several harrowing months in Kunming and Lijiang, he was finally evacuated to India in 1944, then flown directly to Washington D.C. where the Army Map Service used his knowledge of the mountains in southwestern China to help their pilots safely over the "Hump."

In 1946 Rock was back in Yunnan as a research fellow of the Harvard Yenching Institute. He struggled to finish his studies before the inevitable chaos of post war China and illness forced him to evacuate again in 1949. After the fall of Tibet in 1950, he gave up hope of ever returning to China, and during the last years of his life, he led a peripatetic existence between Hawaii and America and Europe, tending his ills in diverse spas, and seeing books into press. His journeying was not mere travel; he travelled typically from Hawaii to Rome via Vancouver, Mexico City, Yucatan, Havana, Bermuda, Madrid, Zurich, and Vienna (see Burkill Letter no. 1: p.31).

Rock's success as an explorer and plant hunter reflect on his abilities, and as Sutton (1974: p.114) writes in her biography: "When the situation demanded, he observed local customs with a tact and precision that few Westerners attempted, much less attained."

Cox (1986: p.199) wrote that,

> Rock has always been a most praiseworthy collector. His herbarium specimens are numerous, and seed sent home by him has been cleaner, with fewer rogues, and with a better percentage of germination than that of any other collector. Of all those who have collected in China, he has probably been the best fitted for such work,...

Rock's two honorary doctorate degrees and numerous awards were a hard won recognition of his achievements. He died in Honolulu in 1962.

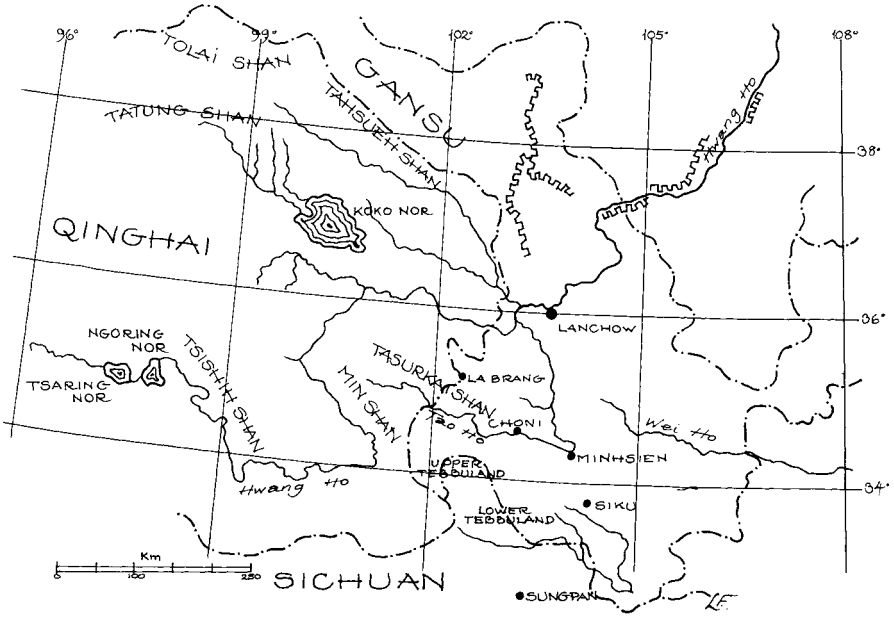

Fig. 3. The Arnold Arboretum Expedition, 1924-1927.

Aksel Olsen

Aksel Olsen was born in 1887. For more than 75 years of his life he practiced horticulture, first in his father's, Thomas Olsen's nursery, then as an apprentice in north German nurseries, and finally in his own firm, "Brændkjærhøj" which he started in 1917 in the Danish town Kolding, where he was born. "Brændkjærhøj" became a nursery in an entirely new class of its own. (Fig.4).

Olsen started with perennials and alpines, and from there expanded to include conifers. He specialised in many plant groups, beginning with herbaceous *Paeonia*, which was represented by over 90 cultivars and species, many from the Japanese nursery, Yokohama. He photographed and painted the most beautiful of these plants, and they were for decades a staple offer in his catalogue.

But Olsen was too much an eclectic to be a narrow-minded specialist, and along side the *Paeonia* he grew as much of the plant kingdom as he could accomodate on the nursery. In the 1922 catalogue there were also: 44 species and cultivars of *Primula*, 42 of *Delphinium*, 50 of *Iris*, 38 of *Phlox*, 44 of *Saxifraga*, 22 of *Lilium*, as well as kitchen garden plants, ferns, grasses, aquatic plants, and 565 different alpines (A. Olsen, 1922).

Olsen also embarked on an ambitious hybridisation program for *Lupinus arboreus* x *polyphyllus* in order to increase the colour range of hardy

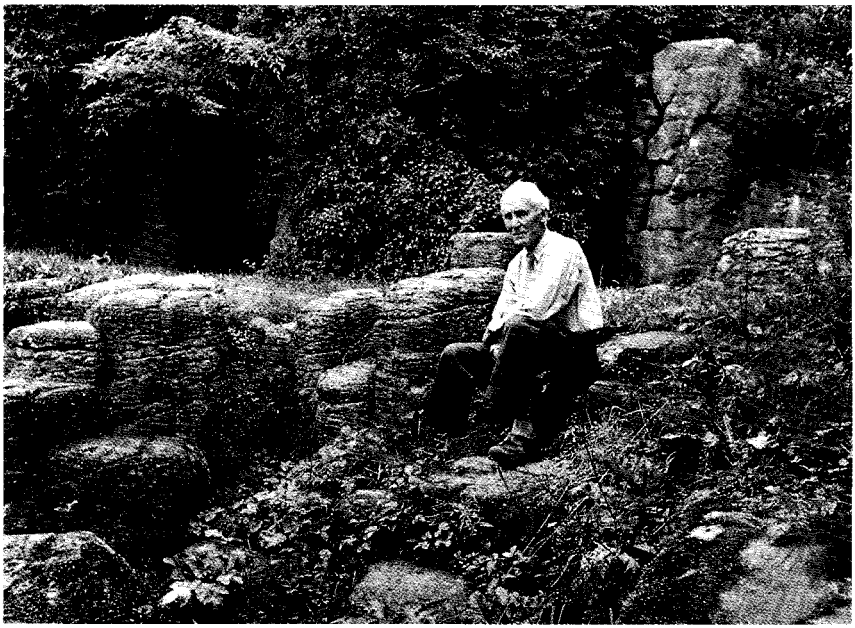

Fig. 4. Aksel Olsen in front of the cave, Brændkjærhøj. Photograph from the fourties.

perennial lupines. This work lasted 32 years and resulted in 334 numbers from which he selected a number for sale. These he called 'rainbow lupines,' and he studied them at great length, drawing them all in colour at 3 different stages of their flowering period in order to assess their qualities. Among his introductions from this period in addition to all the species that were new to cultivation in Scandinavia, especially those from Asia, are his own selections: *Iris chrysographes* cv. 'Stjerneskud' (1925), *Trollius hybridum* cvrs. 'Kraterild' and 'Fuldmåne' (1924), *Oenothera tetragona* cv. 'Fyrværkeri' (1915), and 10 selections of *Aster dumosus*, 6 of *Delphinium cultorum*, and of *Paeonia albiflora*. (O. Olsen, 1977).

The genus *Rosa* was the next to which Olsen turned his attention, and after several years of weeding out the most unsuitable, he finally offered 155 roses for sale, including cultivars and hybrids of polyanthas, ramblers, old and modern roses, and 56 species, of which he was the most fond, due to their beauty and durability in the garden.

By this time, (the thirties) "Brændkjærhøj" had become a very well known nursery in Scandinavia, and Olsen had contacts, customers and colleagues all over the northern hemisphere. He traded extensively with firms in France, Holland, Germany, Great Britain, and Japan. He corresponded with botanic gardens, and with Scandinavian missionaries in the field in Asia, and he was beginning to see the first fruits of his exchanges

with W.W. Smith of the Royal Botanic Garden, Edinburgh, from whom Olsen received seed of George Forrest's and F. Kingdon Ward's expeditions, among which he found a number of good *Primula*, *Meconopsis*, *Gentiana*, and *Rhododendron*.

Also at this time, Olsen's fascination with the extrordinary richness of China began to take hold of him, and he began a lifelong study of its history, peoples, geography, and flora. Inspired by the accounts of all the plant explorers' trials, and by the beauty of the plants coming into circulation, Olsen plunged in to this work with a characteristic enthusiasm and energy which has inspired generations of gardeners since, not only because of his memorable lectures, articles, and drawings, but perhaps at least as much due to the plants that streamed from "Brændkjærhøj". There was experience, knowledge, and spirit enough to make up for the careers of at least two nurseries.

Olsen became a regular contributor to the horticultural press in Scandinavia and Germany where an article on species of *Rhododendron* caught the 'fledgling' Dietrich Hobbie's eye in 1931, and set him on the path which culminated with his famous rhododendron nursery in Oldenburg, (Floto and O. Olsen, 1967: p. 11). And his section on *Rhododendron* in the *Nordisk Illustreret Havebrugsleksikon* from 1948 is still one of the best accounts of this genus written in Danish.

Aksel Olsen's interest in China remained for him an ideal, which he determined to keep as just that. He had no desire to see China for himself: he was certain that it would never measure up to his own expectations of what it was like. He did however get the good idea of making knowledge of life in China available for a wider public in Scandinavia by writing a kind of composite account of all the plant hunters'experiences in one book (that was in fact a series of articles written for the Royal Danish Horticultural Society's periodical, *Haven* in 1933-34). He let himself be taken along on a collecting trip by the "English botanist," Mr. Scot. Olsen's description of the people, plants, and landscape of China was so convincing that many of his readers believed that it was a first hand account.

This was at the core of Aksel Olsen's work. He had a natural-born talent for expressing beauty wherever he found it, and he believed that it is vital for the well being of people that they have the possibility of seeking a quiet and beautiful place, such as a well-made garden where they can rest from the pressures and withering influence of an alienating society, and find a restorative for both body and soul. By a well-made garden he meant one that provided a private room furnished with plants to suit the owner's needs and that respected the nature of the surrounding landscape (A. Olsen, 1922/24, s.a.=27; Petersen, 1977). He turned his nursery into a demonstration garden to show the effectiveness of perennials, alpines,

aquatic plants, trees, and shrubs in meeting any need.

Aksel Olsen, like R. Farrer in Great Britain, did battle with the old Victorian "rockery," which he called, "a tyrant and a parasite that gives no quarter to either the plants or the gardener (A. Olsen, 1924)." Instead, he showed how natural and beautiful a depression or valley with properly placed stones and suitable plants could exist in the flat Danish landscape next to all the more traditional elements in the garden. And he was equally instructive on the effect of colour and form in the garden, and of the effect that the changing of the seasons has on a garden. All of this information was contained in his nursery catalogues, as well as in the numerous pamphlets which he wrote and illustrated on specific plant groups or garden features, or the history behind a plant's discovery or its uses and qualities. He was fond of demonstrating the taste or smell of a plant, such as the petals of *Rhododendron decorum* on a good Danish rye sandwich (A. Olsen 1930: p.24).

Aksel Olsen used his skills as an illustrator as a tool for plant study. (Fig.5). He always made certain of a plant's identity, and often drew it at different seasons and stages of development. His two copies of Rehder's *Manual* have almost as much annotated text in the margins as there is of the printed text. These drawings, most of them in colour, with accompanying notes, make up the over 10,000 entries in his study catalogue over all

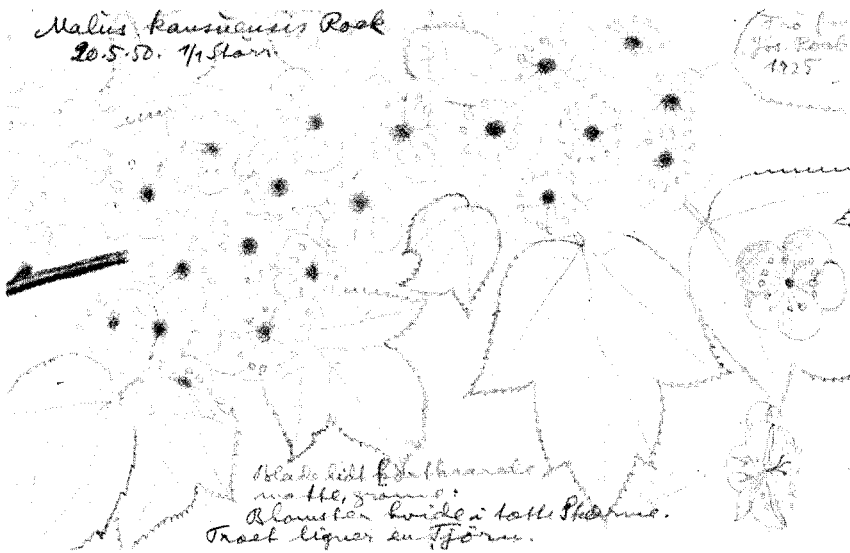

Fig. 5. *Malus kansuensis*. Illustration, A. Olsen, 1950.

of the different taxa which he grew in the six decades in which he ran the nursery. This catalogue, together with Olsen's 'source list' (*Kildeliste*), over the provenance of nearly all the same plants, is a unique and invaluable record of plant introduction in Scandinavia. The precision of the information and quality of the drawings make the plants instantly recognisable.

The culmination of Aksel Olsen's career at "Brændkjærhøj" was the establishment of Kolding's Geographical Garden. Olsen kept the nursery proper, including the very first geographical garden, and sold the rest of the land, with his second geographical garden, *Syvdalen*, to the county. It agreed to retain him as a consultant to supervise the construction and curatorship of Kolding's Geographical Garden in its first years. In 1968 it was opened to the public, and today it contains an outstanding collection of well developed, considerably sized plants from Aksel Olsen's lifetime with plants, arranged geographically, planted in natural groups, and providing just the opportunity to find a quiet inspiring place to contemplate the diversity and beauty of the plant kingdom, and its undeniably important influence on human beings. Aksel Olsen died in Kolding in 1982.

THE ARNOLD ARBORETUM EXPEDITION 1924-1927

In 1924 Rock arrived in Kunming, Yunnan on his way to explore the Kansu and Eastern Tibet region under the joint sponsorship of Harvard University's Arnold Arboretum and Museum of Natural History. (Fig.3). He was to spend two years collecting plant and bird specimens and propagation material and to determine the distribution of mesophytic species growing in Sichuan and Yunnan. He also had a commission from the National Geographic Society to explore and map the Amnyi Machen range in eastern Tibet. In 1922 Rock had met the British general George Pereira, who had seen the Amnyi Machen from over 170 km away, on the second of his journeys from Peking to Lhasa. "But God disposes, Rock later magnanimously wrote, General Pereira died soon afterward on the cold and hostile Chino-Tibet frontier, at almost the end of his third extraordinary overland journey across China (Rock, 1925)." Armed with the good general's journal, Rock set off to "seek the mountains of mystery" through the dangerous Ngolok's territory, whose natives used 9 metre lances to kill strangers and where the Russian Roborovski was driven back in 1895 and the German Karl Futterer was robbed and arrived later half-naked at Taochow (Rock, 1953: p. 154).

The director of the Arnold Arboretum, C. S. Sargent, was looking for a fresh territory with plants hardy for North America and Northern Europe. The Kansu Territory had in fact already been crossed and recrossed by several explorers, none of whom remarked emphatically about anything but the savage winds and cold, bare mountains and plains. The Russians – Sosnovski, Piasetski, Berezovski, and Roborovski all explored the Kansu territory. Most notably, Nikolai Przewalski in 1870-73 and 1880-84 and Grigori Potanin and his wife, Alexandra, on their third expedition in 1884 came through from Turkestan. Besides having mountain ranges and horses named after them, they also discovered and introduced such plants as *Larix potaninii, Prunus davidiana* var. *potaninii, Rhododendron przewalskii*, as well as *Daphne tangutica* and several alpines. All of these they sent back to St. Petersburg Botanic Gardens, where the eminent botanist and explorer, Carl Johan Maximowicz, determined and published them (Cox, 1986: p.112ff.).

Two Britons and an American and his assistant had also explored this territory. They had a rather cool meeting by coincidence in the winter of 1914 in southern Gansu. Reginald Farrer and William Purdom met the Dutch American Frank Meyer and his assistant, de Leuw, in the hamlet of

Zhuggu. Meyer's temper got the better of him when his two Chinese assistants tried to desert him, and as Farrer magneloquently wrote, "There was a rapid descent of the stairs by the interpreter, followed by a coolie,...(Cunningham, 1984: p.180)." Farrer was an alpine specialist and accomplished author and collector, who wrote about his Asian travels in two books, *The Rainbow Bridge* and *On the Eaves of the World.* Purdom had been in southwest Gansu and adjacent provinces once before, where he came up nearly empty handed on account of the barrenness of much of the country, "as naked as Truth, and almost as unattainable, wrote Farrer (Cox, 1986: p.22)." This time they were out for alpines, which they found; but more memorably, they found *Viburnum farreri*, and *Rosa farreri*, both rare and exquisite horticultural plants.

Meyer and de Leuw, who collected for the United States Department of Agriculture and Arnold Arboretum, found to their satisfaction Potanin's peach and the wild bush almond, as well as walnut, pear, apple, hazlenut, cherries, and plums. Coming over from Shaanxi in bitter cold, ice, and snow they also passed *Picea spp., Pinus bungeana, Pistachia chinensis, Castanea, Abies spp., Betula spp,* and *Rhododendron spp.*

Rock's expedition from 1924-1927 yielded a good number of useful and ornamental plants, mostly from the southwest part of the Territory. It was a dangerous and difficult expedition, but Rock brought it off in good form "with but the loss of 2 mules" as he put it. Of the 700 kilometres from Kunming in Yunnan, where he started, to Choni, Gansu, where he established a base, he wrote: "Much of a most unpleasant nature has happened to me in recent months." He was ambushed and beseiged along the way by bandits and spent the worst night of his life with his two Colt 45.s loaded and emergency rations at his side, awaiting attack. It was a land in the middle of winter, stricken with famine and war, everwhere were dead and dying soldiers along the way ravaged by each other and by wolves. Rock had also to part fighting factions within his own 190 man military escort at the risk of being caught in the crossfire (Rock, 1925: p.134).

Glad to be rid of these horrors with the onset of spring, he arrived in Gansu just as still another war was underway, this time between Moslems led by the ruthless and greedy General Ma chi fu, whose impositions on the Tibetans started the war, and Tibetan lamas and their nomad allies.

This was a gruesome war, especially from the Moslem side, as they used machine guns to slaughter Tibetans on the open grasslands. Considering that Rock was dependent on the goodwill of both sides for the success of his expedition, it is amazing that he accomplished anything at all.

Rock found a haven "in the best town in the best part of the country" in

the Tibetan lamasary of Choni, on the Tao River. The Tibetan lama-prince with the Chinese title, Yang Chi Ching, a scheming, despotic and easily flattered man, ruled the lamasary. Rock saved a six year old boy from the death decree of Yang during his stay and improved conditions for the prisoners in the Choni jail, six of whom were Tebbus punished for not growing the Princes' melons and squashes to perfection; these were a gift of seed from Rock to the Prince and the Tebbus had no idea what kind of plant they were (Sutton, 1974: p.42). But Yang was otherwise the perfect host for Rock. He gave Rock the Living Buddah's (a boy of ten) house to stay in, as well as letters of introduction to the other lamasaries in his territory which Rock used as bases. Yang also exercised his authority over the 'malodorous monks', as Rock called them, which enabled Rock to study and photograph their lives over the space of one and a half years. Rock wrote up his experiences in Choni in an absorbing *National Geographic* article and for the *London Illustrated News*, with the title, "Butter as a Medium of Religious Art", describing one of the lamasary's more curious religious festivals.

Rock gave a fascinating account of this and other ceremonies as well as of the daily life of the monks in Choni in his *National Geographic* article, "Life Among the Lamas of Choni." For the Butter Festival, monks belonging to a craftman's guild were hired during the middle of winter by a monastery to sculpt religious images in coloured yak butter- the amount used and skill of the craftsmen reflected on the status of the monastery among the people. For one festival in Choni, 10 monks worked with 590 kg. of butter for a month to sculpt the images that Rock photographed. Some of the ceremonies that Rock witnessed are still practiced in the Tibetan Region (Rock, 1930).

Rock went north to the Kokonor region (Qinghai Lake) in the fall of 1925 to escape the war and explore the plains and adjacent mountain regions as far north as the Mongolian Desert (the Ordos).

In the spring of 1926 he made his way to the Amnyi Machen via the Ragya Gomba Monastery and Yellow River (Huang He) gorges. At this monastery, in the buddha's rooms he discovered fifty different ancient watches and clocks ticking away all on their own time, and Rock presented him with a "pretty good" new watch and a $ 20 gold piece (Rock, 1925: p.159).

In a side trip to the Jupar Range and Ba Valley in central Qinghai, Rock found scattered primeval forests of juniper and large spruce trees in the deep gorges. It was an otherwise stark red sandstone landscape that reminded him of parts of Colorado. This is also where the thick loess blanket of the Huang He valley begins, and the vegetation is sparse.

In July 1926 Rock finally made it to the Amnyi Machen region through

the dangerous Ngolok country with the help of the Jazza chief, Dadda Gomba, and the entire male population of his clan. The scenery was magnificent, and he found ancient spruce forests, but generally only alpines since the massif is so high, from 4700-6300 metres. The ice was still 60 cm. thick on the streams, and a snowstorm buried the whole landscape one night, which prompted Rock to comment on the hardiness of species of *Saussurea* and *Meconopsis*, looking as cozy as his Tibetan escorts, curled up in their sheepskin coats in the snow (Rock, 1925: p. 185).

The best collecting area was in the southeastern part of the Territory, in the Tebbu country, between the Tao River and the Minshan Range. The British plant hunter, E. H. Wilson had collected extensively on the south side of the Minshan in Sichuan on two separate expeditions in 1906 and 1911. The whole area was then covered in a rich climax coniferous and deciduous broad leaved forest of towering species of *Abies, Picea, Tsuga, Pinus, Larix* and *Betula* with an understory of *Acer, Tilia, Sorbus, Malus, Cotoneaster, Berberis, Rosa*, and a host of other plants that Rock described as a "garden of Eden." Rock and his collectors were in the Tebbu country three times – in the spring of 1925, and the autumn of 1925 and 1926. His reports back to Sargent describe a botanical and zoological paradise with virgin forests towering to nearly 60 metres. He lists at least 35 genera of trees and shrubs. In the lower valleys he found species of *Ailanthus, Koelreuteria, Pistacia, Cephalotaxus, Keteleeria, Cupressus*, and *Pterocarya*. In the higher elevations, even in August, there was ice on Rock's tents every morning at sunrise, and he harboured hopes of the plants' being hardy enough to stand Massachusetts winters.

Nearly a year after his planned ending of the expedition, Rock finally had to escape from the advancing Communist armies in 1927. He left Choni through the Tebbuland, crossed the Yangtze, and after a dangerous journey, made it to Chengtu, in Sichuan. From here, he was evacuated on a Japanese boat.

The Choni lamasary was attacked by the Mohammedans in 1928, just months after Rock's escape. Most of the lamas were killed and the monastery burned to the ground. By good luck, Rock saved two important artefacts from Choni. One was a single-flowered *Paeonia suffruticosa* that grew in the courtyard of the house where he stayed. (Rock letter no. 3: pp. 209-211). He photographed it and collected seed, and it is now known as "Rock's form" and is a very worthy garden plant. It has proven hardy as far north as Stockholm. (See *Paeonia* in the plant section).

Rock also saved a complete copy of the two Tibetan holy books, the Tandjur and Kandjur, sending them to the Library of Congress in Washington, D. C. The original wooden blocks used at Choni to print them were over 500 years old and said to form the most perfect edition in

existence. Only one other complete edition was known, at Lhasa. It took 45 monks three months to print and bind this copy for Rock on handmade paper. Since the destruction of the Tibetan Lamasaries by China, this copy obtained by Rock is in all likelihood the best one extant (Rock, 1930: pp. 581-582).

Geography, Climate, and Vegetation

The Kansu and Eastern Tibet Territory (Gansu and Quighai Provinces) is a transitional area geographically, ethnically, and politically. China's Huang He plain gives way to the Mongolian and Sikiang deserts, the Tibetan plateau, and the mountains of southwestern China. The huge Kunlun Mountains break up into a series of several high ranges from between 3200 and 6200 metres, running northwest – southeast from Inner Mongolia to Tibet and Sichuan. These are Rock's Richtofen, Nanshan, Kokonor, Lien hoa shan, Jupar, Amnyi Machen, and Min Shan ranges. (see *Encyclopedia Britannica* vol. 10). The Huang He detours around the Amnyi Machen in a 1600 kilometre bend, descending through 2000 metre deep gorges as it cuts its way through the loess plains and starts on its 3700 kilometre journey to the Yellow Sea.

The northern part of the territory, called Tangut (Mongolian for Tibet) since before Marco Polo skirted its boundary in 1273, is arid and supports forests only in sheltered valleys on northern slopes over 3000 metres, mostly of a single species of spruce (*Picea asperata*). Xerophytic scrub such as *Rosa xanthina, Caragana spp.*, woody *Compositae*, and grasses dominate the driest areas and large groves of *Juniperus*, *Ulmus*, and *Populus* form gallery forests along riverbanks. Low-growing forms of juniper also grow in exposed sand dunes (Wang, 1961: p.64).

The flora of the mountains north and east of the Gobi resembles this flora to a remarkable degree and indicates that these isolated forests may be the remnants of a montane coniferous forest that at one time was much larger. Also the widely spread *Ostryopsis davidiana* grows wherever there is a little moisture and is very likely a relic from the same flora (Wang, 1961: p. 225). The grasslands of central and southwest Qinghai resemble the high grassy steppes of Tibet, with alternating areas of wet bogs and drier areas of grass. These grasslands extend all the way to the border of the very well developed montane forests of the Minshan to the east (Wang, 1961: pp. 200ff.). They are the celebrated Amdo region of Tibet, known for its horses. Between the Richtofen and Kokonor ranges, on the Quaidam plain at 3200 metres, lies the sky blue Kokonor Lake (Qinghai hu, which also lends its name to the province). It is a deep brackish sea covering roughly 5000 square kilometres. It is surrounded by mountains and a sea of grass with virtually no other vegetation. A cold steady northwestern

wind roars out of Mongolia in the autumn. It nearly blew Rock's tent into the lake one night in October 1925 and held the temperature down to -16 degrees celsius most of the time he was there. Between the Kokonor and Kanchow (Zhangye), on the edge of the desert to the north, Rock and his party found scarcely enough wood to cook two meagre meals a day (Sargent et al., 1926: pp. 68-70).

It was in the Minshan range, the Tebbu country, where Rock collected most of his plants. Here the vertical zonality of the vegetation belts is very pronounced, as in Sichuan and Yunnan to the south. Pure and mixed forests of fir and spruce dominate in the cool, moist upper elevations, with willow scrub and rhododendrons above 3200 metres. Hemlocks, larches, and pines form mixed stands with a richly developed deciduous broad leaved mesophytic forest of birches, maples, linden, oaks, ash, poplars, rowans, and rhododendrons. An extensive understory of barberries, roses, cotoneasters, mock orange, aralia, and many other species of shrub and perennial plant is reported to be common in much of the Minshan. These woods form a link between southwest China's rich mesophytic forests and the poorer, more cold-tolerant forests of the northern provinces. Elements of both extremes meet in the Minshan flora, where the same or related species occupy similar ecological niches, together with transitional species. (Wang 1961)

Enumeration of the plants collected by J. F. Rock for the Arnold Arboretum in Kansu and Eastern Tibet, 1924-1927.

This is the title of A. Rehder and E. H. Wilson's determination of the plants Rock collected. It is published in parts of *The Journal of the Arnold Arboretum*, from 1926-1933, and includes Rock's abbreviated field notes, with reference to earlier collections and taxonomic discussion. The Arboretum also enlisted the help of botanists from other institutions for special plant groups. W.W. Smith at Edinburgh, Handel Mazzetti in Vienna, and Frederich Diels in Berlin, with several others, helped in determining Rock's collections.

There were over 20,000 herbarium sheets, many of them duplicates; over 1600 of woody plants, the rest were fungi, grasses, orchids, and herbs. There were 601 seed lots, many in great quantity, as well as cuttings of such plants as poplar and willow. Seed was distributed to 41 botanical institutions in North America and Northern Europe. (See Sargent letter no. 4). Seed was sent to the Botanic Garden, Copenhagen, which distributed it further among the Arboretum, Charlottenlund, the Forestry Botanic Garden, Århus, and 2 Danish nurseries, Aksel Olsen's, and D. T. Poulsen's. Sargent also sent seed to the Bergius Botanic Garden, Stockholm. There were also hundreds of photographs of exceptional quality,

showing plant specimens, habitats, and cultural subjects. The National Geographic Society received most of the latter.

It is difficult to ascertain to what degree Rock collected seed of herbaceous plants, which accounted for the majority of his herbarium specimens. Seed of species of *Meconopsis, Primula, Iris,* and *Podocarpus* was collected and distributed, but if it was only these popular genera, or more, is uncertain.

There were undoubtedly some very attractive plants, as Rock described beautiful alpines from the genera *Saussurea, Primula, Meconopsis,* and the *Umbelliferae,* and there are some potentially valuable garden genera among the enumerated plants such as: *Allium, Lilium, Fritillaria, Rheum, Silene, Gypsophila, Delphinium, Aconitum, Thalictrum, Saxifraga, Sedum, Heracleum, Androsace, Gentiana, Ligularia,* etc., with several species of each. But the seed which he did collect has yielded a number of useful and orna-

Fig. 6. *Abies faxoniana*, Rock no. 14989. Arboretum, Hørsholm. Oct. 1991. Phot. H. Vedel.

mental plants for many climates – from the North American plains to Scottish forests, and for gardens all over the World.

Sargent made it clear to the institutions receiving seed that Rock's collection numbers were of absolute importance since the determinations were not to be made for several years (Sargent to Lange, letter no.4). Unfortunately, many of the institutions and nurserymen growing the seed discarded the Rock collection numbers once the plants were determined. It is now difficult with these plants to determine if they are Rock's collections or not. Taxonomic mistakes and revisions further complicate the situation. That botanists tend to take such a narrow view of species variation, based wholly on the little material available to them in their collections, disregarding provenance and the very hard-won experience of the collector in the field is deplorable.

Aksel Olsen was fortunately acutely aware of these problems and went

Fig. 7. *Picea asperata*, Rock. no. xxxxx. Arboretum, Hørsholm. Oct. 1991. Phot. H. Vedel.

to great lengths to maintain the identity and integrity of the plants he raised. He studied them in detail and kept alert to their horticultural potential. Not only are his records, drawings, and plant collections of inestimable value in this regard, but his students, colleagues, and connections abroad all benefited from his thoroughness and abilities.

Olsen devoted the larger part of his second Geographical Garden (Syvdalen) to Rock's collections, thus giving the plants ideal growing conditions. After decades of experience with the plants, he was confident of his judgement on their suitability for the Scandinavian climate. He also made certain that he traded with as many other growers as possible, thus ensuring the widest possible range of Rock numbers growing under different conditions. From Olsen's, and his colleagues' work in Scandinavia, we have a legacy of horticulturally valuable plants from Rock's collection, well suited to the local climate. Among these are Olsen's unsurpassable selection of Rock's *Betula albo-sinensis* var. *septentrionalis*. There are also: *Malus kansuensis* (Fig. 5), and *M. transitoria*, *Sorbus hupehensis* var. *aperta*, *Tilia chinensis*, *Picea asperata* 'Louisiana' (grown by D.T. Poulsen's nursery of Kelleris, Denmark), and its other blue forms, *Hydrangea bretschneideri*, K. E. Flinck's *Aralia chinensis*, and in the Arboretum in Hørsholm, Denmark, one of the most comprehensive and well-grown collection of Rock's conifers in existence. So said Rock when visiting in 1959, and these trees and their progeny are still a very good collection (Rock, letter no. 5; pers. comm. S. Ødum, Arboretet, Hørsholm).

A number of Rock's collections, much prized by Olsen, are now unfortunately lost to cultivation. Among these are: *Primula tangutica*, *Meconopsis punicea*, and *M. racemosa*, *Incarvillea compacta*, *Berberis parvifolia*, *Syringa oblata var. giraldii*, and *Hedysarum multijugum*.

Discussion of species

This discussion follows the enumeration as listed in *The Journal of the Arnold Arboretum*, nos. 2 and 3, vol. IX, 1928, no. 4, vol. XIII, 1932, and no. 1, vol. XIV, 1933; and concentrates on taxa found in Scandinavian collections put into a wider perspective from a botanical and horticultural point of view, *i.e.*, also in other collections, and in gardens. Unless specified otherwise, all references credited to Rehder, Wilson, or Sargent are from the *Journal of the Arnold Arboretum*, with vol. and no. cited. In many instances present locations of Rock's collections in Scandinavia are quoted in the text, but for a complete list see App.III. In *Index Herbariorum* are listed the locations of Rock's herbarium material. The Botanic Museum, Copenhagen (C) has both type material and duplicates as well as sheets of the plants raised and cultivated from Rock's seed in their collections. References in this section to herbarium specimens are based on these sheets. See also App. I.

CONIFERAE

Abies

Except for the widely spread, northern species of spruce, *Picea asperata,* and a few *Abies* and *Juniperus*, all of Rock's collections are from the montane coniferous forests of the Minshan, which are but an extension of the southern conifers' distribution, from Sichuan and Yunnan, and of the species found to the east. Indeed they are at their limit of growth in the west and north of these two provinces, existing only in sheltered valleys and gorges on northern slopes as far north as the central ranges and at higher elevations. (This might account for their general hardiness in Scandinavia, particularly *Picea.*) The centre of distribution for the Chinese *Abies* would seem to be just to the east of Gansu, in the Tsingling Range of Shaanxi. *Abies chensiensis* and *A. fargesii,* both with outlying populations in Gansu, were not collected by Rock (except *A. chensiensis* see below) but a detailed study might lend itself to a more modern interpretation of the taxa represented by Rock's collections; as indeed *Abies faxoniana* and *A. sutchuenensis* (both Rehder and Wilson) are commonly accepted today as varieties of *A. fargesii* Liu. Edinburgh has determined Rock 14989, *A. faxoniana*, to be *A. fargesii*, and *A. faxoniana* Rehder and Wilson is a very variable taxon, at times resembling even *A. forrestii.* (Fig.6). The 3 *Abies* collected by Rock are all in section *Elateopsis* (Matz) Liu, having leaves with median resin ducts, emarginate apex, revolute margins; purple cones with thickened ovuliferous scales and bracts as long, or longer than the ovuliferous scales (Liu, 1971: pp. 137-138). They are all typical of the transition zone between northern and southern species.

Rock found the three *Abies* taxa in pure or mixed stands with species of *Picea, Betula, Acer, Sorbus,* etc., mostly towering from 30 – 45 metres in the valleys, but only 6 – 7 metres on the mountain tops. He wrote to Sargent from Choni saying that in the Tebbuland he had found "at least 10 species of spruce, and a large number of species of fir" (Sargent et al. 1925: p.215), which if it is not a wanton exaggeration, is at least an indication of the variableness of the species involved.

The herbarium specimens of these three taxa are remarkably uniform-all have short needles (close to 1 cm.), and rather small dark cones (some still intact). The needles of *A. fargesii* var. *faxoniana* and *A. recurvata* are very flat and broad.

Bean is of the opinion that *A. fargesii* var. *sutchuenensis* is one of world's most beautiful firs, and *A. recurvata* can be a handsome tree, as is a well grown *A. fargesii* var. *faxoniana* which has long swinging branches that present the silvery undersides to advantage in contrast to the deep sea green upper sides. They seem to do better in Denmark than in Sweden, (K. E. Flinck,

Fig. 8. *Picea wilsonii*, Rock no. 16064. Arboretum, Hørsholm. Oct. 1991. Phot. H. Vedel.

pers.comm.), and the Arboretum in Hørsholm, north of Copenhagen, has the best collection of *Abies*, with a good collection of young 25 year old grafts of several Rock numbers as well as the original trees. Aksel Olsen and his colleagues were very succesful with the seed and grew hundreds of plants of both *Abies* and *Picea*.

Ref. Liu (1971); C. Syrach Larsen, "Arboretet i Hørsholm, och Forstbotanisk have i Charlottenlund," *Lustgården*, 1947-48, Stockholm; Chittenden et al. (1932); Krüssmann (1985: plate 5); Sargent, et al. (1925); Aksel Olsen, drawings, catalogue, records and *Kildelisten*; Bean (1976).

Picea

Rock collected three species of *Picea*: *Picea asperata, P. likiangensis* var. *purpurea*, and *P. wilsonii*. They are all three a part of the *Picea abies* complex,

Fig. 9. *Pinus armandii*, Rock no. 13463. Forsthaven, Charlottenlund. Oct. 1991. Phot. H. Vedel.

and as mentioned previously, the highly polymorphic *P. asperata*, and its varieties, is the most widely spread (Wang, p. 32). It is also the best known in cultivation, being very hardy and of fairly vigorous growth, especially in its bluest forms, most of which originate from Rock's collections near the Ragya Gomba monastery in the arid Huang He gorge between 3200-3350 metres (per.comm. K. Lorentzon, and E. H. Wilson, 1928, pp 8-10). The collection of Rock nrs. in the Arboretum, Hørsholm, with several greges, shows all the variation typical of this species. The needles vary from blunt to very prickly, and they are arranged either radially around the branchlet, which varies from white to cinnamon red, or they are arranged into two lateral ranks. (Fig.7). Their length varies from less than 1 cm. to over 2 cm., and they are straight to curved, at times almost recurved. The crown too varies from very broadly pyramidal to narrowly upright. K. E. Flinck, in his arboretum at Bjuv, Sweden, has several Rock

P. asperata from different sources, appreciating that it is not as harshly blue as *P. pungens* can be and that it does not deteriorate as quickly as *P. pungens* tends to do. He states too that it tolerates drought and dry air very well. N. D. Poulsen in the 1940s found a very blue *P. asperata*, that supposedly comes from France, but whether it is a Rock collection or not is uncertain. (There is also a very blue *P. asperata* at Hørsholm from Vilmorin and very blue trees among the Rock numbers). It was sold to the owner of Louisiana, north of Copenhagen, before he could propagate it, but he was allowed to collect scions. He grew it and offered it for sale for several years, without its ever gaining a wide acceptance, but it is an excellent form, very blue, with the cultivar name, 'Louisiana' (Poulsen, 1978, p.70, and per. comm., 1991). F. R. S. (Bailey?) Balfour planted 2 acres south of Edinburgh with *P. asperata* as an experiment in forestry. They were well developed, 3 metre tall trees by the time of the Royal Horticultural Society Conference on conifers in 1931 (Chittenden et al., 1932).

Picea likiangensis and *P. wilsonii* are perhaps garden worthy and do well in Hørsholm. (Fig.8). They will most certainly become better known as new collections from China reach the West.

There are 23 herbarium sheets of these 3 species in Copenhagen with entire cones, some with the needles still attached to the branch. The range of *P. asperata* from the entire territory is well represented, the more glaucous forms being from both Ragya and from the Nan Shan, facing Mongolia, according to Rock's field notes.

Ref. *Havens Planteleksikon* (1980); Poulsen (1978); Krüssmann (1985: plate 91); A. Olsen, drawings, catalogue, records and *Kildelisten.*

Pinus

Rock collected *Pinus armandii* and *P. tabulaeformis,* neither of which seems to have survived in good shape in Denmark, except at the Forestry Botanical Garden, Charlottenlund, where there is one good specimen of each. *P. armandii* is from the central Gansu mts., 3050 m.(Fig.9), and *P. tabulaeformis* from the Upper Tebbu country, 2800 m., where the trees were up to 24 m. *Pinus armandii*, most certainly Rock's, does however do well at the Flinck Arboretum. Here there are 3 plants, one each from the Arboretum, Hørsholm, D. T. Poulsen's Nursery, and the Bergius Botanic Garden (K. E. Flinck, pers. comm.). It is a very attractive 5 leaved pine with emerald green cones and *P. parvifolia* – like leaves, only not curly.

The herbarium specimen of *P. armanii* is a luxuriantly furnished branch with tight bunches of uniform needles.

Other gymnosperms

Of the rest of Rock's conifer collections, *Juniperus* stands out, both because they were so widely spread in the arid regions, and because of their stature – up to 15 metres for *J. distans* and a creeping new form of *J. chinensis*, named var. *arenaria* from the Kokonor sand dunes. *Juniperus kansuensis*, a low, compact juniper, was not collected by Rock. Aksel Olsen germinated some plants of nearly every number, but what became of them is a mystery. Most likely, they were too tender (Olsen, plant study catalogue). Rock noted that junipers were sacred to both lamas and natives of Tibet and China.

Also collected by Rock in Gansu: *Ginkgo biloba, Cephalotaxus fortunei, Larix potaninii, Abies chensiensis*, one tree 30-45 m. tall, and *Cupressus duclouxiana.*

ANGIOSPERMAE

Smilacaceae

Smilax rubrifolia, woody climber, small dark red flowers, slender inflorescence, unarmed. This was described as a new species by Rehder. Rock found it growing in the Tebbu country, along stream banks between 2100-3200 m. It is now lost to cultivation.

Betulaceae

Ostryopsis

Ostryopsis davidiana was discovered by Abbé David and described in 1873 by Decaisne. It was collected by E. H. Wilson in 1910 and 1913. Forrest, Purdom, and Ching also collected it (Sargent, 1988), and Rock found it on the banks of the Tao River. It was growing among boulders along the river-banks. Bean writes that "it is an interesting little shrub with the habit and foliage of a hazel (Bean, 1976)." It is a persistently small, inconspicuous shrub in the Botanic Garden, Copenhagen. The Bergius Botanic Gardens, Stockholm also has a specimen with missing Rock number. *Ostryopsis* has an incredibly wide distribution, from Yunnan in the south, where a second species, *O. nobilis*, also grows all the way to Chili in the north. It could perhaps best be described as a poor cousin of *Corylus*, pushed out of the woods, and into the plains, where no self respecting *Corylus* would be caught dead or alive. (except *C. sieboldiana* var. *mandschurica*, which in the Kansu Territory is as shrubby as the *Ostryopsis*). – Note, that some students refer *Ostryopsis* to *Hamamelidaceae.*

Ref. Sargent et al. (1928: p.22); Sargent (1988, vol. 2).

Fig. 10. *Betula albo-sinensis* var. *septentrionalis*, Rock. no. xxxxx. Arboretum, Hørsholm. Oct. 1991. Phot. H. Vedel.

Betula

Rock collected four species of *Betula* under many numbers. *Betula platyphylla* var. *rockii* and *B. platyphylla* var. *szechuanica* are of lesser importance horticulturally, compared with *B. albo-sinensis* and *B. albo-sinensis* var. *septentrionalis*. Especially the variety is an exceptionally beautiful tree of large stature (20 m. or more), with coppery red peeling bark, revealing a glaucous bloom underneath. This is an adult characteristic which is fixed through vegetative propagation by nurseries; most recently, and elegantly, by micropropagation in Alnarp, Sweden (pers. comm. Søren Ødum, Hørsholm; Jansson and Welander, 1990). Rock was not the first to collect this beautiful birch, but it is primarily his collections which are the best known in Scandinavia. Aksel Olsen's, now made available by A. V. Jacobsen, Glamsbjerg, Fyn, Denmark, has an astonishingly bright shim-

Fig. 11. *Acer maximowiczii*, Rock. no. 15047. Arboretum, Hørsholm. Oct. 1991. Phot. H. Vedel.

mering trunk, by far the best of Rock's collections grown in Scandinavia. The original group of trees from which it was selected are still growing in Kolding, in the nursery and in "Syvdalen". These trees have about reached the end of their lifespan, 60-80 yrs. Another huge and beautiful specimen is in the Forest Botanic Garden, Aarhus, Jutland. It was grown by the garden's first director, N. J. Bang, a contemporary and colleague of Olsen. Through this garden, which contains several of Rock's plants, Bang expanded his ideas for bringing plants close to city-bound people, a vision that is responsible for the fine parks and forests that surround Aarhus today. Growing in the Forest Botanic Garden there, in the Botanic Garden, Copenhagen, and in the Arboretum, Hørsholm, are also several specimens of the type, *B. albo-sinensis*, which is a small shrubby tree with very close bark, of a dark red colour, or dark yellowish. In the Minshan, it

is more alpine than the variety, growing up to tree line and usually mixed with other species. The variety forms pure forests at lower elevations and grows to at least 30 m (Sargent et al. 1928: pp. 3-24). They are both widely distributed in the mountains of Southwest China.
Olsen grew hundreds of plants of both copper birches and of the Sichuan birch, but of the latter, only one tree exists – raised and grown at the Copenhagen Botanic Garden.

Ref. Protokol, Forstbotanisk Have, Århus; A. Olsen, *Kildelisten.*

Ulmaceae

Rock saw large *Ulmus pumila*, to 24 metres, growing along rivers and in gorges in northern Qinghai and Gansu. He collected seed, but it was not distributed to the Botanic Garden, Copenhagen. However, seed of *Celtis bungeana* from central Gansu was sown there in 1926. The very attractive specimen growing today by the office has no collection no. and could be Rock's or another's. *Celtis bungeana* was sown in the Garden in 1927, but this specimen does not quite match the herbarium material (F. Arnklit, pers. comm.). It is definitely worth a try in production, as a fine alternative to the overplanted *Ulmus carpinifolia* cultivars where there is room for it to grow. American research indicates that *Celtis* is susceptible to *Ceratostomella ulmii*, yet as long as its vector remains contented with *Ulmus*, then its more exotic cousins should be considered as safe alternatives (pers. comm., Dr. A. Yde-Andersen, Statens Forstlig Forsøgsvæsen, Lyngby).

Ranunculaceae

Clematis
There were 12 species of *Clematis* determined among Rock's collections, one of them a new species, *C. brevipes*, with creamy flowers that resembles *C. fargesii* but with bipinnate leaves. Only *C. aethusifolia*, grown as a greenhouse plant in the Botanic Garden, Copenhagen, still exists. In his large catalogue for plant study, Olsen drew its delicate, pretty, leathery, glistening leaves and numerous small yellow flowers from the plants he raised. He also grew Rock's *C. fruticosa*. Rock found *Clematis* climbing among small shrubs and in trees in forest clearings, as well as scrambling along the loess banks of the Tao and Huang rivers.

Paeonia

The only voucher specimens of any *Paeonia* that Rock collected for the Arnold Arboretum are of the two herbaceous species *Paeonia anomala* and *P. veitchii*. The origins of his *P. suffruticosa* known as 'Rock's form,' 'Rock's variety,'or in Sweden also as 'The Prince of Choni's form,' have never been clear, except that it was known that Rock collected it in the courtyard of the house where he stayed. He collected seed and made a photograph, but did not take a voucher specimen for the Arnold Arboretum. He apparently only sent seed to the United States, sometime after 1932 from where the British *Paeonia* expert, Major F. C. Stern obtained seed, as well as growers in Canada, Sweden, and Great Britain. Stern's plant flowered at Highdown for the first time in 1938, and was the basis for his description of the taxon (c.f. cult. 10/5/1938, Kew Herbarium). Like all its siblings in the grex, it had large white flowers with a deep purple base, similar *P. papaveracea*. Quick to discover its superior beauty, and the implications of its discovery, Stern wrote to Rock with queries as to its origins. Rock replied from Kunming in 1938:

> The seed of the *Paeonia* about which you enquire I collected from plants which grew in the Yamen of the Choni lamasary, elev. 8500 ft. in S. W. Kansu,... In the Court of the Yamen grew a very beautiful *Paeonia*. There were no double flowered ones, all were single. I remarked at the time that it looked to me like a wild species. The lamas told me it came from Kansu but where, the exact locality, they did not know. I never came across it in a wild state,... I took a photo of it growing in the court and I enclose a copy with my compliments,...(letter no. 3).

Glad to hear of the peony's popularity in Europe, Rock asked for seed, which Stern sent, and Rock planted in his garden in Kunming in 1939, just before he evacuated to Indochina to sit out the war (he thought). He also gave seed to the American consulate garden in Kunming. Today Rock's form is a rare plant in cultivation, at least in its true form according to the most recent treatment by S. Haw and A. Lauener in Great Britain. Their conclusion is that Rock's plant corresponds to a voucher specimen collected by Farrer in the wild in Gansu. They describe it as a plant with "more or less white flowers with basal blotches very deep purple and a more or less triternate leaf with 19-31 leaflets." Its proper name should be *P. suffruticosa* subsp. *rockii*. Haw points out correctly that any plants bearing Rock's name would have to be vegetatively propagated, which apparently is very difficult.

There is one more wrinkle to the *Paeonia* story in Scandinavia. The Bergius Botanic Garden in Stockholm supposedly has the plant from seed

from the Arnold Arboretum in 1927. From here it is known as a variable plant with purple or white flowers that is both hardy and attractive. These plants are all seedlings of the original introduction, which Haw discounts as open pollinated offsprings with other *P. suffruticosa* plants. However if the Botanic Garden can show that its original plants in fact are from seed from the Arnold Arboretum, and that they actually have purple flowers, then Haw will have to revise his latest treatment.

Ref. S.Haw, *The Plantsman*, vol 13.part 2, Sept. 1991, and *The Edinburgh Journal of Botany* 47: pp. 273-281, 1990; H. Wanntorp (letter no. 13); F.C.Stern, *A Study of the Genus Paeonia*, the Royal Horticultural Society, Vincent Square, London, 1946.

Berberidaceae

Berberis

Berberis is a widely spread genus in central and southwest China, and it is no surprise that none of Rock's 9 species added to any of those previously made by other collectors. They are well represented in the collections of all the Scandinavian Botanic Gardens, usually without any documentation. Olsen was particularly taken with *B. parvifolia*, *B. kansuensis*, and *B. caroli-hoanghensis* (*B. vernae*), which he found pretty and graceful, as is evidenced by his drawings.

Saxifragaceae

Ribes is represented in Gansu and Qinghai. Rock found several species, growing usually in the forest understory or cultivated as a hedge and for fruit. There are several Rock nos. in the Botanic Garden, Copenhagen. They grow well, and are useful, but have no particular ornamental merit. Most of them are very well armed and form impenetrable thickets, as noted Rock in his field notes.

Two other plants in this family collected by Rock are however excellent plants for the Garden. *Philadelphus pekinensis* var. *kansuensis*, called *P. magdalenae* in the Edinburgh collection (Rock 15046), has extra large flowers. Olsen got 300 plants from the Rock seed entrusted to his care and offered it for sale as a large shrub for 1.50 Danish crowns in 1930.

Hydrangea bretschneideri, found today in Bjuv, Kolding, and the Forest Botanic Garden in Aarhus, is an upright shrub to 3 m. with interesting mahogany brown, peeling bark, and creamy yellow to purple bracts. It deserves a protected spot in a wood, but will repay this attention by

growing into a pleasing, neat and appealing shrub, and is a welcome addition to the rather limited range of *Hydrangeas* currently offered by Scandinavian nurseries. Rock found it under the forest canopy in the Lower Tebbuland in southwest Gansu, and his collection seems to be noticeably hardier than Wilson's *H. xanthoneura*, which it resembles.

Rosaceae

The *Rosaceae* are represented by no less than 15 genera of woody plant in the Kansu territory. Six are tree genera and the rest creeping or upright shrubs. The 8 *Spiraea* species, like the *Berberis*, are widely spread and well represented by other collectors and in the botanic gardens. Four species of *Rubus* were grown by Aksel Olsen, and doubtlessly had merits, but were probably too tender for Scandinavia. *Sorbaria arborea* var. *glabrescens*, too, was already common before Rock's collection, although it is a large thriving shrub in the Botanic Garden, Copenhagen, today, probably at least as good as any other introductions. *Exochorda giraldii* is also similarly represented. Rock found it in arid forests and gorges, and Olsen grew 90 plants, which were among the other forms he grew in the thirties.

Prunus

Also of these dry habitats are the *Prinsepia uniflora* and shrubby *Prunus spp. P. tangutica, P. salicina, P. stipulacea, P. setulosa, P. tomentosa*, and *P. pseudocerasus*, all of which are represented in collections in Scandinavia and North America, from Rock's and other collectors' introductions. These *Prunus* species have their place in the garden, especially in the rock garden, some of them (the hardiest for Scandinavian climates), where they can be planted in exposed situations, and add interest with their spring flowers and fall foliage.

The more arborescent *P. padus* var. *commutata* and *P. pubigena* were growing in dense forests with *Abies* on the Minshan, and Rock was impressed by their stature and the size of their foot-long inflorescences.

The herbarium specimens in Copenhagen of *P. stipulacea* show an attractive foliage and shapely flowers that Rock noted to be a good pink colour.

Crataegus kansuensis, "unremarkable" in Olsen's judgement, has soft pulpy, red-orange fruits, and is related to *C. wattiana*, from across the desert in the Altai mountains in Baluchistan according to Wilson. The herbarium specimens in Copenhagen have quite attractive leaves, with large stipules and according to Rock's field notes, with bright red fruits. The leaves are not pinnately lobed as stated by Rehder (1986), but are shallowly lobed.

Pyrus pashia is a handsome pear found in the Stockholm and Kolding collections. It has red leaves in the fall, and small yellowish red fruits, reminiscent of a rowans.' The Rock *Pyrus* growing at the Morton Arboretum in Lisle, Illinois, is apparently not a *P. pashia* (per. comm., M. Stieber, 1991).

Rosa

Rosa graciliflora Rehder and Wilson is a bit of an enigma. It was described for the first time in *Plantae Wilsonianae*, based on a collection made by Wilson to the north east of Kanding in 1908. It is according to Rehder related to the yellow flowered *R. xanthina*, in the section, Pimpinellifoliae, but with rose coloured flowers and red heps. *R. farreri* Stapf is placed in the same position, with fewer prickles, and darker heps. Both have very graceful, pendulous branches, rather small leaves, 4-10 cm., with very small leaflets, 9-11 per leaf. Since *R. farreri* was collected in Gansu, it may be that Rock did collect it, but there is no record of it. Rock 12186 is *R. xanthina*, but apparently not sown in Denmark. There is at the nursery, Brændkjærhøj, Kolding, a charming, attractive rose, supposedly, *R. graciliflora*, but that could be *R. farreri*. It is probably Harry Smith's 12714, or 12892, according to Olsen's records, obtained from Botanic Garden, Gothenburgh, in 1936. It is about 2 metres, with red branchlets and a multitude of small *R. moyesii*-like flask shaped heps, persisting until mid winter. At the Botanic Garden, Copenhagen, is a cutting of this plant labeled P 1966/5714, with 'Rock ? ' printed on the label. It cannot apparently be referred to any of the species named (pers. comm. F. Arnklit, 1991). This plant, whatever its origin, needs further study, and deserves more notice among rose enthusiasts.

Of the 9 species of rose collected by Rock, only a handful still exists in Scandinavian collections. They are all represented by the collections of Wilson, Purdom, and others, but they seem to have been more or less forgotten by the modern rose fashion.

R. bella, a fine red rose with large pyriform brilliant red heps, is at the Bergius Botanic Gardens.

Rock 13495a is *R. davidii*, with red flowers and an upright vigorous form is possibly in the Botanic Garden, Copenhagen. Bean (1976) writes, "it is handsomest in autumn, when laden with its pendulous clusters of bright red fruits".

R. sweginzowii, with pale pink flowers and large flattened spines in the manner of *R. pteracantha*, "is a first rate back scratcher" according to A. V. Jacobsen, Fyn. It is found at the Bergius Botanic Gardens. Olsen has a story, related by Fritz Graf von Schwerin who visited the nursery in 1935

that the Russian General Sweginzov and the German botanist Koehne sat beside one another at a formal dinner once in Russia. Koehne asked the General if he weren't loved by his peasants, to which the General said, "No rooster will crow for me when I die". Koehne replied that he had just received a shipment of new plants from China and that he would immortalise the General by naming a new plant in his honour; thus Sweginzov's rose and lilac. (A. Olsen, *Kildelisten*). Olsen grew Rock 14903, a very hardy, low, richly thorny form he called *R. sweginzowii* cv. 'Superba' with "a horde of light purple-red flowers and large beautiful boss, and bursting in the fall with long flask-shaped bright red heps, more so than any other wild rose in the garden,... (Olsen, 1933)".

R. sweginzowii was supposedly lurking for many years under the number 13570a in the Botanic Garden, Copenhagen, but when surveyed in 1991 the plant in question turned out to be an entirely different species. The three herbarium specimens from Rock's duplicates are however *R. sweginzowii*, and what has become of the original plant sown from the seed no. is unclear. The thorns on these specimens are dark, as are the branchlets. According to the taxonimist at the garden, Dr. Rahn, these specimens match poorly with the description given in *The Flora of China*, and there are apparently several quite different forms of *R. sweginzowii* in cultivation in Scandinavia. In a note to 13570 in the *Journal of the Arnold Arboretum*, Rehder mentions that two sets of seed were distributed under this no. One corresponded to *R. sweginzowii* and the other to *Prunus padus* var. *commutata*.

R. omeiensis was made famous by Wilson in 1908. K. E. Flink's Rock collection is a hardy large shrub, and is quite dependable. *R. pteracantha* (or *R.omeiensis* var. *pteracantha*) in Denmark had typically large blood red extremely flattened thorns, but Rock's 13590, grown by Olsen, was hardier although with smaller, less red thorns. (Olsen, 1933: p.11).

Rock's *R. willmottiae* was considerably hardier than the forms introduced earlier into Denmark but not as attractive. Aksel Olsen found one very characteristic form among Rock's collections with red shoots and leaves in the spring and early summer, which he called *R. willmottiae purpurescens*. (A. Olsen, 1933; see also appendix II)

Rock found these and other roses growing along river banks, in gorges, and on mountain sides in the *Abies* understory of the Upper Tebbu.

Ref. A. Olsen (1933); *Nordisk Illustreret Havebrugslekskon*, 233-241, Copenhagen, 1948.

Potentilla

Rock found *Potentilla fruticosa* in several forms together with *P. biflora* and

P. salesoviana growing almost everywhere in the Kansu Territory, on dry slopes, under forests, in gorges, and on cliffs and mountain sides. These are all shrubs under 1.5 m., universally cultivated and with their recognised merits. The Bergius Botanic Gardens in Stockholm grows *P. fruticosa* vars. *dahurica* and *parvifolia* from Rock's collections.

In a letter to I. H. Burkill of Kew, who was interested in ethnobotany, Rock related that the Tibetans ate almost no vegetables, except for a wild mushroom that grew on the steppes and the fleshy root of the herbaceous *P. anserina*, which they let the marmots collect for them before digging the marmots up with their winter store for at Tibetan meal of "meat and potatoes". (Burkill, letter no. 1: p.235).

Sorbus

In the Minshan and to the north in the central Gansu mountains, Rock found *Sorbus hupehensis* var. *aperta*, *S. prattii* and *S. tapashana* growing on mountain slopes and in the rich understory of the *Abies – Picea* forests, as well as along streams. *S. tapashana* Koehne is apparently only mentioned in Sargent (1988). He grouped it together with *S. helenae* and *S. rehderiana* on the basis of floral and foliar characteristics. It is supposed to have white to rose coloured fruits and large leaflets. It was first collected by Giuseppi Giraldi in the mountains of Shaanxi in 1897 and has presumably not been collected since Rock's day, nor is it in cultivation. (See Appendix I, duplicates of Rock's 12813, 12555, and 13675 are in the Botanic Museum, Copenhagen).

S. hupehensis var. *aperta* is one of the best Chinese rowans for Scandinavia. Olsen grew it, as does A.V. Jacobsen, from a tree growing in the Botanic Garden, Copenhagen. This is Rock 13479 from 2470 m in Central Gansu. It is a graceful tree with excellent fall foliage that is deep red violet and bluish green during the growing season. The fruits are a pure rose colour when ripe. There are now two trees in the Botanic Garden, Copenhagen, under Rock 13479 that supposedly are grafts of the original tree which blew down in a storm in 1967, and was finally removed in 1978. But apparently, however, only one of them seems to be authentic, the other is quite different in habit, leaves, and in that it has never flowered, whereas the correct tree fruits abundantly every year (pers. comm., F. Arnklit, 1991).

Dr. McAllister at the Botanic Garden, Liverpool has ressurected *S. aperta* (syn. *S. hupehensis* var. *aperta*), but I have not read his reason for the basis of his decision. Whether the tree in the Botanic Garden Copenhagen thus agrees with *S. hupehensis* or *S. aperta* is a matter of discussion until it can be compared with his material. *S. aperta* is based in part on Wilson's

type collected from the Min Valley in 1910, together with Giraldi's nr. 5129 from northern Shaanxi.

The differences between the two are based on the leaves and inflorescences. *S. aperta* (according to Koehne) has fewer, wider spaced, more acute leaflets on an unwinged rhachis, a longer petiole, larger leaf, and a glabrous inflorescence that is larger and more open than that of *S. hupehensis*. It also supposedly always has 5 carpels, as opposed to the 3-5 carpels of *S. hupehensis*. I am unaware of the differences in grosser morphology. Rehder referred Rock's collections from Gansu to Schneider's variety of *S. hupehensis*.

Although Koehne included Giraldi's specimen in *S. aperta*, he was careful to include its differences of leaf morphology, and he qualified the inclusion somewhat by mentioning that it is rare for a species of Shaanxi also to occur in Sichuan or Hupeh. (Sargent, 1988: p.466). Wilson and Rock were collecting on opposite sides of the same mountain range, so perhaps the same can be said of *S. aperta* and *S. hupehensis*. See App. I for information on the herbarium specimens in Copenhagen.

Rock's *S. koehneana* from southwest, central, and western Gansu is quite variable according to E. H. Wilson's treatment. Rock found it to be anything between a shrubby bush, 1.5 m, to a tree, 6 m. One form he found had a silvery leaf underneath. The plant sent by Bertil Hylmö to Hugh McAllister at the University of Liverpool Botanic Garden originated with Olsen (Hylmö, letter 9, 1991) and is probably Rock 13268, "a much branched shrub, 1.5-2.5 m., with pure white fruits from the Kokonor gorge," according to his field notes. McAllister determined it to be *S. fruticosa* and notes that it is drought tolerant, with attractive chocolate brown twigs, is precociously fruiting, and is an (obligate?) apomict (McAllister, 1986: p.6).

Rock also found *S. tianshanica* growing in the west and northwestern part of the territory. It extends all the way to the *Picea* forests of Sinkiang and the Altai mountains according to Wang (1961: p.48). Olsen's Rock 13532 was a scion of a tree in the Botanic Garden, Copenhagen, that is no longer in existence at either place.

Ref. Hylmö (letter no. 9); McAllister (1986); Wang (1961); Sargent (1988).

Cotoneaster

Rock collected approximately 12 species of *Cotoneaster*, growing all over Gansu in river basins, in scrub forests, on loess banks, on grassy slopes, and on mountain tops. None of them were new species, and *C. nan-shan* (*C.*

adpressus), as well as *C. horizontalis*, *C. multiflorus* var. *calocarpa*, and *C. latevinens* are in Scandinavian collections today. A more thorough search of southwestern China's *Cotoneaster* would probably restore some of the lost forms from Rock's and the others' collections, as well as revealing new forms, valuable to horticulture.

Ref. B.Hylmö (letter no. 9).

Malus

In the Tao river basin, Rock found *M. toringoides*, *M. transitoria*, and *M. kansuensis* as well as hybrids between them. The first two are quite good ornamentals for the garden, with mostly lobed leaves, large corymbs of white flowers, and yellowish red fruits. The trees in the Botanic Garden, Copenhagen, however, suffer from competition and are unhealthy. This cannot be said of *M. kansuensis*, growing in the same situation. It is a small tree of 4 m., with peeling bark in the manner of a quince and large very neat 3-5 lobed leaves, rather like those of *Sorbus torminalis* – downy beneath, on long red petioles, and with bunches of yellowish purple fruit. It is a first class tree for the garden. See the appendices; the Bergius Botanic Garden, Stockholm, have Rock's *M. baccata* 13502, and his *M. kansuensis* x *toringoides* 14925.

Ref. Bean (1976).

Fabaceae

Caragana

This genus is very common in the Gansu and Qinghai provinces, as would be expected of such semi-desert plants. Rock found them in rocky ravines, on grassy hillsides, and in gorges and on the outskirts of spruce forests. The genus name is, according to Bean, the Mongolian word for the Pea Tree, *C. arborescens*. Rock found 8 species, all but one named by the Russian botanist Komarov, an indication of their long standing with the botanists of St. Petersburg. The plants collected by Rock were from a variety of specimens, from a low creeping *C. tibetica*, to upright 3 metre "trees" of *C. densa* and *C. jubata*. This last is the only one without yellow flowers, but has purplish red to pink or pale pink flowers. They are all useful plants, some of them of good decorative value as well. The Botanic Garden, Copenhagen, has several Rock collections, and the Bergius Botanic Garden selected a very robust, erect, tortuose, fuzzy *C. jubata* in 1933 and gave it the cultivar name 'Columnaris' It is presumably from the Rock collection. It is pictured in Krüssman (1984: plate 96, vol. 1). Rhodes

(1956) described the Rock *C. jubata* of almost the same habit growing at the Canadian Experimental Station in Morden, Manitoba, together with several other Rock collections. Rock's herbarium specimens of *C. jubata* in the Harward Herbaria are represented by this form as well as by several tiny, extremely compact nature plants measuring only 5-10 cm in height.

Hedysarum multijugum is another plant described at St. Petersburg for the first time, by Maximowicz in 1881. Rock collected it from central Gansu where it was growing in the loess banks along rivers. No. 13226 had rich carmine flowers, one of the qualities that attracted it to Aksel Olsen. He was already growing it when he started his nursery in 1919, and was amazed that it stood up to the worst rain, frost, and drought that Jutland could threaten a plant with. He was also very taken with its habit: light brown zig zag twigs, with light grey green pinnate leaves that contrasts nicely with the numerous elegant racemes of flowers in July. It is a plant upon which he lavished much notice, as well he might, since it seemed to be quite unsusceptible to everything but the whims of the gardening public. Olsen's description and growing tips for this plant suggests that he had a better form, and more experience in growing it than Bean, whose description is rather restrained, due to the muddy flower colour and ungainly habit of his *H. multijugum* var. *apiculatum*. Olsen recommends pure sunbaked clay as the best site for the plant, and not sandy loam, where it invariably becomes leggy and sickly. The plant is now lost to cultivation.

Ref. A. Olsen (1927: p. 132); Sargent t al. (1928); Bean (1976).

Celastraceae

Rock collected about 5 taxa of *Euonymus*, all of which had been collected previously, and are found today in many botanic collections. See App.III for a list of the plants in Scandinavian collections.

Aceraceae

Acer

The *Acer* of southwest and central Gansu are extensions of species growing in the large mesophytic forests of Sichuan and Yunnan to the south. Here maples associate with other deciduous broad leaved trees in the forest belts surrounding the mountains. Rock's collections fill out the northern limits of these species and enabled Rehder in 1933 to finish his key for the section *Macrantha* (the striped bark maples). Although they are attractive

trees, their place is mainly in the botanic garden. They definitely do markedly better in Denmark than in Sweden, where they seem to lead stressful lives full of bark splitting, fungi infections, and slow death, which perhaps for that climate makes them less desirable than the other striped barked maples that make attractive trees in Sweden. (K. E. Flinck, pers. comm.). The specimens growing in the Botanic Garden, Copenhagen, Arboretum, Hørsholm, Forest Botanic Garden, Århus, and Kelleris Arboretum, are typically shapely, pleasant trees and perhaps deserve another try in nurseries to see whether they can add anything to the selection of smaller *Acer* currently offered. Olsen and D. T. Poulsen thought Rock's *A. davidii*, *A. maximowiczii* (Fig.11), and *A. tetramerum* var. *betulifolium* well worth growing, and as the selection of maples offered today was not so extensive then, they perhaps had good reason to.

Acer caudatum var. *multiserratum*, in the Botanic Garden, Copenhagen, is mislabled – the plant resembles *A. platanoides* while the herbarium specimen looks much different with crenate teeth and smaller leaves. Apparently taxonomists cannot agree about this species either. – Bean outlines its aliases in association with 2 different species: *A. acuminatum* and *A. papilio*. Krüssman too retains *A. caudatum*, but as a synonym of *A. papilio*, and separates *A. multiserratum* and *A. acuminatum*, from *A. caudatum*.

Ref. Sargent & al. (1933); A. Olsen, Kartoteket.

Tiliaceae

Tilia

Tilia chinensis, Rock 13484, is easily the most undeservedly overlooked tree among his Gansu plants grown in Scandinavian collections. This perfectly hardy, wonderfully sized, curiously motley-barked tree has grown quietly among the other lindens in the *Tilia* section of the Botanic Garden, Copenhagen, for decades, yet for some unfathomable reason it still remains oblivious to the *T. cordata*-crazed legions of public planters who continue a blind search for "a platonic ideal" of a tree that satisfies their peg and hole approach to city planting. Rock's 13484 is from the northern slopes of Shanshen Miao, 2900 m., and must have been a sight almost as breathtaking as those other forests of coloured trunks, the copper birches. It is reported to be a bit difficult to propagate (pers. comm., K.Lorentzon, 1991).

Elaeagnaceae

None of these plants seemingly still exist from the hundreds raised by

Olsen. Rock's *Hippophae rhamnoides* 14991, with deep red fruits when ripe, is perhaps the most desirable. The Tibetans used the fruit for toothache, he noted.

Elaeagnus angustifolia was a much cultivated plant with the Moslems of the northern plains, prized for its fruit. Meyer found them enjoying it as we do bananas with our morning cereal. They traded this fruit to the Tibetan monasteries, where Rock noted that it was reserved for the exclusive enjoyment of the higher ranking lamas – eaten only on feast days with yak cream and sugar. (Cunningham, 1984: p. 274; Burkill, 1951: p. 235).

Araliaceae

Rock found 4 species of *Acanthopanax* growing in the understory of spruce, willow and birch forests, in southeastern and central Gansu. The Bergius Botanic Gardens has *Acanthopanax giraldii* and the Botanic Garden, Copenhagen, *A. leucorrhizus*, which although seemingly a bit tender is sufficiently exotic with its green stems and large flat thorns at each petiole base to warrant attention.

The specimen kept at the Botanic Museum, University of Copenhagen, is a very attractive branch. *A. leuchorrhizzus* in the Botanic Garden, Copenhagen, is dying (see App. I and III).

The very successful Rock collection of *Aralia chinensis* var. *nuda*, probably Rock 15085, is found at the Bergius Botanic Gardens, in K. E. Flinck's arboretum at Bjuv and in Kolding, (K.E. Flinck, and L. Houborg, pers. comm.) It is perfect for the Scandinavian climate, because it starts growth and flowering in time to set fruit, which most *Aralia* rarely do in Scandinavia (B. Nordström per. comm., 1990), and it is hardy. This plant was also restored to cultivation to Hillier's Nursery, from where it had disappeared, by the Botanic Garden, Göteborg (K. Lorentzon, pers. comm.). Rock collected it on forested slopes in the Tebbu country, at 2600 m. He was very enthusistic about its inflorescences, which were several feet long with rich yellow flowers and black fruit.

The *Aralia* in the K. E. Flinck Arboretum, from Aksel Olsen's Rock collection, is apparently the type and not the variety, which is characterised with glabrous glaucescent leaves underneath (except along the midrib), smaller leaflets, and longer petioles (pers. comm K. Lorentzon, and Rehder, 1986; Krüssman, 1984). What to make of the differences between the Arnold Arboretum's and the Flinck Arboretum's determinations is disconcerting, yet interesting. J. Lange determined Rock 15085, growing in Olsen's second Geographical Garden, Syvdalen as the type. Olsen had

a double "suspenders and belt" solution in his 1930 catalogue. Here he offered "*A. elata (chinensis)*" for sale !

Cornaceae

Cornus macrophylla: Olsen raised 10 plants of Rock 14968. Rock 13483, from grassy slopes of the central Gansu mountains, grows at the Bergius Botanic Gardens, as does a tree at the Botanic Garden, Copenhagen (this is Rock 14662). Bean (1976) writes that it is a handsome and striking tree with fine foliage. The leaves are from 10-18 cm., with a long acuminate apex and purple, pea-sized fruit. It is maybe not quite hardy in exposed areas, but does fine in the city. A newer introduction in the Arboretum, Hørsholm, from Japan, is after 14 years a sturdy and attractive small tree.

K. E. Flinck had Rock's *C. macrophylla* from Olsen's nursery for many years until the hard winters in the mid-eighties. There is also a specimen at the University in Alnarp (from Olsen ?), and the Rock 14662 in the Botanic Garden Copenhagen. Flinck is of the opinion that this *Cornus* in fact represents a new species, and not *C. macrophylla*. The two specimens cited do not seem to agree very closely with *C. macrophylla*.

Ref. Bean, (1976: p. 704); Protocol, the Arboretum, Hørsholm.

Ericaceae

Rhododendron is at its limits in the Kansu/ Eastern Tibet Territory. Rock was very surprised to find *R. anthopogoides* and *R. thymifolium* growing on the arid mountain slopes and in gorges of the Richtofen range at 3700 m. *R. capitatum* and *R. micranthum* were growing in alpine meadows and on steep mountain slopes in the Minshan, central Gansu mountains, and in Eastern Tibet (Qinghai). He found *R. rockii*, a handsome new species, named by Wilson in his honour, in the rainforest of southern Gansu, near the Sichuan border. It has apparently not been collected since and is, according to Davidian not in cultivation.

But *R. przewalskii* and *R. rufum*, the former being the most alpine, grow all over the Minshan, between the mountain tops and the lower reaches of the *Abies – Picea* forests. *R. przewalskii* grows as far north as the Richtofen range, at the higher elevations. It is in the *Lacteum* series, is from 0.6-2.5 m., with large corymbs of small pink to white flowers, sometimes with crimson spots. The leaf has a characteristic yellow midrib and petiole and is usually glabrous. Davidian mentions that the leaf is coriaceous, a characteristic which is not mentioned by Wilson or Cox.

R. rufum is a much larger shrub, up to 4.5 m. in the *Taliense* series. It is

usually leggy in the wild, has white to deep pink flowers and a bistrate indumentum, the lower layer a dense reddish brown, according to P. Cox and E. H. Wilson. Cox also says that in its best forms it is almost as good a foliage plant as *R. bureavii* and that both *R. rufum* and *R. przewalskii* are hardy in Scandinavia.

Aksel Olsen raised 6005 plants of several Rock numbers of these two species, some of which gave 700-800 plants per number. They tried his patience sorely. In a letter to Olaf Olsen, former director of the Botanic Garden, Copenhagen, he wrote, 40 years after the seed germinated, that only one plant of *R. rufum* still lived and that it had finally flowered after being forced to do so and that with a very anti-climactic result.

Karl Evert Flinck has had for a number of years a Rock *R. rufum* from the Botanic Garden, Copenhagen, and here it has been a worthwhile plant. Unfortunatly it died after a falling pine crushed it in a storm a few years ago. This plant was a graft of the "Aksel Olsen form." There is supposedly also a *R. rufum* from Rock's collection at the Bergius Botanic Garden (K. E. Flinck, pers. comm.). In the Forestry Botanic Garden, Århus, there is a plant of each species (Rock's coll.) growing in the rock garden. The very fine group of *R. rufum*, growing in the Botanic Garden, Gothenburg, are from Hummels' Gansu expedition in 1930 and not Rock's. These plants are seemingly more deserving of Coxs' praise than the Rock collections.

The variation seen in the herbarium specimens of the Botanical Museum, Copenhagen, leave little doubt that although the plants raised from Rock's seed are for the most part gone, there are good reasons for trying with new collections. The best *R. rufum* have a thick red indumentum, fairly large truss, and according to Rock, some of them at least, an attractive flower colour. The one sheet with flowers of *R. przewalskii* is also apparently an attractive plant- especially if it was a compact plant. It has also a silver plastered indumentum, somewhat similar to that of *R. insigne*.

Ref. P. Cox, *The Larger Rhododendrons*, 1990; Davidian, *The Species of Rhododendron*, vol. II, 1989; Protokol, Forestry Botanic Garden, Århus.

Oleaceae

Syringa is the best known genus of Oleaceae from the Kansu Territory, although Rock collected *Fraxinus platypoda* in the mixed forests of the Lower Tebbu country as well. These were trees of 24 m. He also found *Forsythia giraldiana* along stream banks and *Jasminum humile* on dry arid slopes. Rock collected two wild and two cultivated specimens of *Syringa*, considerably fewer than the 7 species Father Fiala (1986) lists for the

territory in his monograph. (This book is a good source of unpublished Rock photographs from the Arnold Arboretum, but there are a number of glaring mistakes of geography, dates, and itineraries which must be exorcised from a revised edition). Rock collected *S. microphylla* and a white flowered *S. oblata* var. *affinis* in the courtyard of the Choni lamasary. He later wrote to Burkill that in the courtyard of another famous lamasary at Kum Bum in Qinghai the founder of the Yellow Sect was supposed to have seen in the leaves of a *S. oblata* a thousand shining images of the Buddah that inspired him to make this the seat of his new order (Burkill, Letter no. 11).

Olsen raised 120 plants from three of Rock's numbers that are no longer to be found in any documented collections in Scandinavia. All of Rock's *Syringa* were well known in cultivation before he collected, and of these *S. pekinensis* seems to be enjoying a well deserved revival. This is yet another tree with shiny reddish brown bark from the Territory. One of these that Purdom collected in northern China had "markedly exfoliating bark with larger and thinner papery flakes very much like that of *Betula nigra* (Sargent & al., 1928: 111)," which sounds very appealing indeed!

Ref. Royal Botanic Garden Kew, Burkill Letter no. 1/11; Fr. J. Fiala (1986).

Solanaceae

Lycium chinensis, found only in the Forest Botanic, Århus (there is also a mislabled plant in the Botanic Garden, Copenhagen, that might belong here), is in all probability a Rock collection, but it is not certain. The attraction of this plant is that it has all the qualities of *L. halmifolium* but without its aggressiveness. The Århus plant is from 1943, is a tidy shrub, and seems quite content to decorate its 2 square metres without complaint. Both specific epithets have apparently been sunk into synonomy and referred back to *L. barbarum* .

Caprifoliaceae

Two representatives of Caprifoliaceae are well distributed in Gansu and Qinghai, *Viburnum* with some 9 taxa and *Lonicera* with at least 8. They were both common in the understory of the Minshan forests in southwestern Gansu and in the mountains of central Gansu. Rock found a number of the *Viburnum* growing near Choni, along the banks of the Tao river, and at the lamasary as cultivated plants. *V. betulifolium* var. *aurantiacum*, a new form with yellowish red, juicy, acid, edible fruits in large drooping clusters, is in

the Botanic Garden, Edinburgh, under Rock 14971 (this happens also to be from the type).

The *Lonicera* collected by Rock were all well known in cultivation, and there are several numbers in European collections. *L. setifera*, (Rock 13250, also in Edinburgh, and collected as *L. chrysantha* var. *longipes*), a compact shrub to 3 m., with flat spreading branches, yellow flowers, and long erect peduncles of red fruits, was also recently reintroduced by Roy Lancaster, who is of the opinion that it is a plant more deserving of notice among horticulturalists. In this class is also *L. syringatha* which although introduced since 1877, is a shrub deserving a wider audience. Aksel Olsen wrote that it is too lazy to flower, and that for that reason he preferred its form *L. syringatha* 'Grandiflora.'

Ref. R. Lancaster (1989); A. Olsen (1952: p. 15).

Salicaceae

Probably none of the *Populus* or *Salix* collected by Rock exist today in Scandinavian collections but his field notes, and Alfred Rehder's descriptions show that there are several interesting and impressive species in the Territory. In the high mountain ranges between 3200 and 4200 m., Rock found alpine willow species forming thickets above treeline or along streams. Most were shrubs between 1-2 m. and some only 30 cm. Others grew in the Huang he and adjacent gorges as small trees.

Among the poplars, Rock collected specimens from huge trees from 20-30 metres, growing in the Tebbu country, and along the Tao River. These are species such as *P. szechuanica*, *P. simonii*, *P. nigra*, and *P. cathayana*, some with clear boles for 15 metres or more.

Epilogue

Aksel Olsen never met Joseph Rock, even though Rock was in Denmark twice in the fifties. Olsen had more of Rock's plants than of any other of the plant hunters' and put more work into them than in almost any of the other plants he received from China. He did much to publicise the existence and qualities of Rock's Gansu-Qinghai collections, and he traded and sold many of the plants to growers all over Scandinavia. Because of his efforts Rock's plants are well spread, well tried, and at least some of them, well known in Scandinavia today. Yet all that work together with all the work done by the other gardeners intent on making the most of Rock's efforts, has very nearly been lost. Rock and his men stayed in the Kansu Territory for two years, at great risk to themselves, and they witnessed incredible devastation and waste of life during their stay. Their success in bringing back so much valuable material and knowledge not only from the flora, but also of the peoples and history of this last frontier of China is one of the best chapters in the history of plant exploration in this great land.

But more could have been saved, and all of it deserves more attention among scientists and horticulturalists today. There are still a number of good plants deteriorating in public and private collections all over the world that should be saved and studied for the future. There is still an incredible amount of material from both men, unpublished and overlooked in libraries and collections that faces the same fate as the plants. In the collections of the Arnold Arboretum and the Royal Botanic Garden, Edinburgh, metre after metre of Joseph Rock's studies collect dust. In fact he wrote a monograph dealing with the Amne Machen region of several hundred pages which seems to have gone unnoticed since its publication. It is time that botanists and horticulturalists take the work of these two men more seriously.

Almost no one knew better than Joseph Rock the importance of acting at the right moment when the future hangs in the balance. And Aksel Olsen recognised a precious plant, idea, or quality when he saw it and he wasted precious little time on the distractions that claim so much of our society's life.

Time is now the ever deciding factor: the chance is still with us to have a hard look at the treasures these two men have lain at our feet. The incredible pressures of life in China today leave little time to act. Expedition after expedition of those that have been fortunate enough to explore China once again, returns with alarming reports of the pace of devastation and destruction in the provinces. Logging proceeds practically without a

plan or eye to the future. Once the trees are felled erosion proceeds at an almost irreversible rate: And in this "least known province and practically empty quarter of China", exploitation and 'development' proceed at a pace dictated by the distant functionary in Beijing with little regard for the irreversible consequences (Sinclair, 1987: p. 280). Rock's Kansu Territory is beseiged by government prospectors, hydrologists, geologists, engineers and the ever hungry mouth of China. The Huanghe, the Dragon of China, River of Sorrows, and life source of the entire northern half of China runs free and unmolested only in its upper reaches which grow smaller and smaller as time slips from mankind (Sinclair, 1987: p. 176).

Joseph Rock's 'garden' was the open and rugged beauty of Southwest China's alpine forests and meadows and Aksel Olsen's was the cultured but inspired garden that depended on that of Rock for its existence. In another few years we risk losing a link to our distant and vital past without ever noticing.

It was drawn to the author's attention just before this project went to press that the Botanic Museum's Herbarium, Copenhagen, is in possesion of nearly all the collections Rock made in duplicate of both woody and herbaceous plant material. These sheets were apparently all sent in 1927-1928, and have Rock's original abbrieviated field notes attatched. This is of course invaluable material for the Herbarium, but even a non-botanist gets a much better impression of the plants and their variation within a species group, and too, one can more easily make one's own judgements with respect to their appearance- *albeit* the plant in the garden does not necessarily resemble the specimen on the herbarium sheet. In some instances, the differences are quite remarkable.

For anyone with a special interest in Rock's collections in particular or in the flora of Gansu and Qinghai provinces, then a visit to the Copenhagen Herbarium (and any of the other herbaria containing Rock's collections) is highly recommended as there is most probably no other record of that flora in the West that is as complete. There are certainly more specimens of both woody and herbaceous plants than are listed in this appendix.

APPENDIX I

Herbarium sheets from Rock's collections in the Botanical Museum's Herbarium Copenhagen 1991

Plant name	Rock number	Status of sheet
Abies faxoniana	13440	duplicate
	13429	
	13429	
	14987	
	12484	
Abies recurvata	?	
Abies sutchuenesis	15020	
	13467	
	12973	
	13635	
Acanthopanax giraldii	12657	3 ft. neat palmate finely toothed lvs.
	12845	very spiny, coarsly serrate
	13534	4-6 ft. spiny
Acanthopanax leuchorrhizus	14721	15 ft.,frt. long drooping pedicels
Acer caudatum var *multiserratum acuminatum*	14727	this specimen looks very different from the tree in the garden!
Acer davidii	14660	rather large, unlobed lvs,cordate base.
	15033	sem. ex Arnold, small lobed lvs. 2 specimens and 2 from Morton, both ex. sem.
Acer maximowiczii	14784	20 ft. with lg. descending br.
	14682	
Acer tetramerum var. *betulifolium*	14984	
	14656	
15051 and 13542, 2 both ex. sem. Arnold, and 13542, 2 ex. sem. Morton		
Aralia chinensis var. *nuda*	14572	flwrs. yellow, tree 10 ft, spiny
Aralia chinensis var. *nuda*	14673	tree 30 ft.
Berberis several specimens, *diaphana, parviflora*, vernæ,...		
Betula albo-sinensis	12609	to 25 ft.
	13621	15-18 ft. short smooth trunk
	13641	20-25 ft.
Betula albo-sinensis var. *septentrionalis*	14969	with bark specimen very red
	14823	sem.ex. Morton
Betula albo-sinensis var. *septentrionalis*	14916	
Celtis bungeana	13503	
Clematis aethusifolia	14577	greenish-ylw. flwrs.
	12867	wt. flwrs.
	15008	sem. ex. Arnold
	?	Farrer & Purdom, 1914
Clematis brevicaudata	14569	cream, neat triternate lvs.
	13614	
Clematis fargesii	12948	large wt. flwrs.
Cornus macrophylla?		

Plant name	Rock number	Status of sheet
Crataegus kansuensis	13500	
	12166	**isotype**
	13501	bright red frt.
	14939	sem. ex. Arnold, lg. stipules
Gentiana futtereri	13660	Koko Nor, grassy slopes, 12,000 ft.
Gentiana hexaphylla	13736	flwrs. prussian blue striped yellow
Gentiana przewalskii	13734	erect, flwrs. with tips bluish purple
Hedysarum multijugum	?	Hedin's
Larix potaninii	12803	
Lycium chinensis shrub, 2-4 ft.	13257	dry gorge, C. Kansu, fr. tomatoe red
Lycium chinensis	13211	4 ft.
Malus kansuensis	14938	erect br., short cymes
Malus toringoides	23132	
	13559	
Malus transitoria	13539	frt. yellow and red
	12188	
Paeonia anomala	?	flwrs, deep pinkish- purple
Paeonia veitchii	589	Farrer & Purdom, 1914, lg. reddish flwrs.
Philadelphus pekinensis var. *kansuensis*	15076	
	14791	
	12821	flwrs. large white, fragrant
	12873	*very floriferous*
Picea asperata	13428	
	12341	
	14316	
	12708	
	15065	
	12968	
	13310	
	14063	
Picea asperata	13903	
	13281	
Picea purpurea	13458	
	12660	
	12937	
	13345	
	12701	
	12974	
Picea wilsonii	12933	
	12543	
	14740	
	14776	
	12087	
Pinus armandii	13643	
Populus simonii ♂	12114	tree appears red due to flwrs.70-80 ft.
Potentilla anserina	12180	west of Choni, tao basin
Prinsepia uniflora	13504	frts. juicy, red, edible
	14957	ex. sem. Morton smaller lvs. than above
Prunus stipulacea	12872	5 ft. shrub, attractive lvs.
	14565	flwrs. wt., with red margins
	13496	

Plant name	Rock number	Status of sheet
Rhododendron capitatum	13674	
	13600	
	13956	with flwrs.
	14006	
	12191	flwrs deep purplish blue
Rhododendron micranthum	14554	
Rhododendron przewalskii	13695	open alpine regions, 12,000 ft., bush 6-15 ft.
	13906	
	12415	specimen with flwrs.
	12189	
	13676	silvery, plastered indumentum
Rhododendron rockii	12081	lg. pinkish purple campanulate flwrs. **isotype**
Rhododendron rufum	13613	10-15 ft.
	14928	cinnamon brown thick indumentum
	12232	sparse indumentum
	12190	
Rhododendron rufum	12374	sp. with pinkish purrple flwrs.
	13650	
	12328	flwrs white with deep pink stripe
	13235	spotted dark
	12156	thick indumentum
	13693	
	13630	
Rosa bella	14110	deep red flwrs.
Rosa omeiensis	13590	
	13575	
	12461	
Rosa sweginzowii	12869	
	14988	
	14896	
Rosa wilmottiae	1591O	
Saxifraga flagrans	12817	
Sorbaria arborea var. *glabra* (*kirilowi*)	12878	lg. leaflets, 6 pr.
Sorbus aperta[1]	14672	
	14672	
	2639	coll. C. Y Chiao, Univ. Nanking Herb.
Sorbus hupehensis var. *aperta*	13479	sem. ex. Morton
Sorbus koehneana	1589	lflts. silvery wt. beneath
	14741	
	13287	
	12863	12-16 ft.
	13540	sem. ex. Morton
Sorbus tapashana[2]	12813	Tao basin with Picea and Larix, 10,000 ft.
	12555	
	13675	
Sorbus tianshanica	14062	
	13372	
Spiraea alpina	12199	dk. red flwrs.
	14133	
longigemmis	12843	several other species
Syringa microphylla	13698	
oblata	15058	sem. ex Arnold
	14687	

Plant name	Rock number	Status of sheet
Syringa pekinensis	14751	
Tilia chinensis	14821	
	14657	
	13484	Cph., sem.ex. Arnold, 1927
	13486	Cph., sem.ex. Arnold, 1927, 2 sheets

1. The are two specimens in the Herbarium that both look considerably different from the tree in the Botanic Garden. It matches *S. hupehensis* in nr. of leaflets, and hair at the base of the leaflet, but *S. aperta* in the reticulate pattern between the veins, the papillæ, and its very open inflorensence. It's fruits are almost entirely white, with only the slightest hint of rose. But the two herbarium specimens match *S. aperta* much more closely- in nr. of leaflets, their size and shape, the underside and in the infloresence. How these two can be so different from the seedling is quite mysterious.

2. This Rowan would seem yo be quite desirable, judging from the herbarium specimen. It has a ferruginate wooly rhachis and midrib, large purple buds, and globular fruits, 3-5 mm.? Rock's field notes also describe it as a tree 15-20 ft., with large rich green leaves, and white flowers in large open cymes.

APPENDIX II

Rock's Plants from Gansu 1924, Counted August, 1927 in Aksel Olsen's Nursery,

plant name	Rock's coll. no.		no. plants grown
Ailanthus altissima	15060		1
Aralia chinensis var.*nuda*	15085		3
Berberis diaphana	13474	or 13574	1
Betula mandschurica var. *szechuanica*	14805		150
albo-sinensis var. *septentrionalis*	14823		80
	14916		60
	14969		20
mandschurica var. *szechuanica*	15017		200
	15018		120
albo sin.	15083		180
Buddelia albiflora.	15071		150
Clematis aethusifolia.	15008		20
Clematoclethra	14985		3
	15015		6
Cornus macrophylla.	14968		9
(*Deutzia* se *Phil.**	13687		300)
Exochorda giraldii	14996		50
	15059		40
Hippophoae rhamnoides.	14991		60
Jasminum humile	15035		150
Koelreuteria paniculata.	14994		3
Lonicera coerulea edulis.	12893		15
ferdinandii	14960		10
Nitraria schoberi	15094		70
*Philadelphus pekinenesis var. kans.**	13687		300
Rhamnus leptophylla var. scabrella.	13608		17
Rhododendron rufum	13601	3 m. rose	130
przewalskii.	13612	2 m.	800
ruf.	13613	5 m. probably rose	75
prz.	13629	1.5 m. white	700
ruf.	13643	1.5 m. pale rose	350
ruf.	13650	3 m. rose	430
prz.	13677	1 m. white	550
prz.	13679	1 m. white	440
ruf.	13680	4 m. rose	250
prz.	13681	1.5 m. white	550
ruf.	13693	2 m. ?	300
prz.	13694	1 m. white	300
ruf.	13696	5 m. purple rose	280
ruf.	13697	3 m. ?	850
Rhodod. eclecteum var. *brachyandrum.*	59112		70
	59126		22
crinigerum	59183		18+AII7
anthosphaerum	59251		200+AII7
anthosphaerum	59252		50+35+AII7
racemosum	59258		AII7
wardii	59253		16
wardii	59530		184

plant name	Rock's coll. no.	no. plants grown
Syringa oblata var. *giraldii*	15058	70
	15063	30
Syringa pekinensis	15070	15
Abies faxoniana	13440	2
	13445	2
	13447	1
	13466	4
	15081	8+10
	15082	2
	15084	10+18+40
recurvata	15087	25
	15088	10
Picea wilsonii	15048	12
asperata	15092	30

here follows 3 deleted lines

Incarvillea compacta	13653	20?
Iris ensata	13657	5 in pots
Meconopsis racemosum	13627	130
punicea	13642	200
integrifolia	13651	50
Podophyllum emodi	14901	20
Primula tangutifolia	13619	180
chionantha	14920	190

see also catalogue for description of Rock's plants		from Aksel Olsen's nursery 1928	from Cph. Bot. 1929	from Bang Århus 1929
Abies faxoniana	13440	1		
	13445	1		
	13447	1		
	13466	2		
	15009			5
	15044			4
	15081	14		2
	15082			1
	15084	22		8
sutchuenese	15079			2
recurvata	15087	15		
	15088	8		11
?		7		
Acanthopanax giraldii	13534		1	
Acer tetramerum var. *betulifolium*	13542		1	
	14997			3
	15032	1		
	15051		2	1
	15053	= *grosseri* in Kew June, 1933 marvelous,...characteristics of *forrestii* and *hersii*		
maximowiczii	14998			1
?	15047	20		1
caudatum var. *serratum*	15010		1	

		from Aksel Olsen's nursery 1928	from Cph. Bot. 1929	from Bang Århus 1929
Ailanthus altissima	15060			18
Aralia chinensis var. *nuda*	15085		3	
Berberis parvifolia	12797		1	
	14911		1	
	13530	(cutting, Cph.)		
diaphana	13474	(13574 ?)	1	
	13525		1	
Betula albo-sinensis	15083		100?	1
(erased, probably a copy of previous line)	15003		100?	1
var. *septentrionalis*	14823		16	1
	14916		15	
	14969		20	
(erased, *mandchurica* var. *szechuanica*	14805		45	
	14916	= *albo-sinensis* var. *septentrionalis*	15	
	15017		50	
	15018		*45*	*1*
Buddelia albiflora	15071		13scion, from Cph.	
Caragana maximowiczii	13538	(not in Kew, 12-06-33)		
tangutica	14965		13	
densa	15061		1	
Clematis aethusifolia	15008		5	
Clematoclethra integrifolia	14985		6	
lasioclada	15015		3	
Cornus macrophylla	14968		10	
Cotoneaster adpressa	13475		1	
horizontalis	13478		1	
racemiflora var. *soongarica*	13523	(scion from Cph. 1929)		
lucida	14980		1	5
multiflora var. *calocarpa* (determined by A.O. as *multiflora*, near *racemiflora*, lvs. + frt. dark)	14992		1	1
Crataegus kansuensis	13500	(scion, Cph.)		
	14908	(scion, Cph.)		
	14917			1
	14939			1
	14956		1	2
Euonymus phellomana	15072		2	1
Exochorda giraldii	14996		40	
	15059		25	
Hippophoae rhamnoides	14991		0	0 0
Hydrangea bretschneideri	13604		1	
	13671		1	
Incarvillea compacta	13653		40	
	?		20 or 2?	
Iris ensata	13637		about 3	
Jasminum humile				
Koelreuteria paniculata			3	

		from Aksel Olsen's nursery 1928	from Cph. Bot. 1929	from Bang Århus 1929
Lonicera coerulea var.*edulis*	12893		15	1 A.O. = *coerulea* or *hispida*
chrysantha var. *longipes*	13516			
	15022		*30 (from Pruhonice)*	
deflexicalyx	14734		1	
ferdinandii	14954		1	
	15078	*rest of line deleted*		
Lonicera heteroloba	14890		1	
Malus kansuensis	13497		1	
baccata	13498	(scion from Cph.)		
transitoria	13539		1	
	14910		*Cph. 1932.*	*1*
Cph. 1932, and 14923	*14922*		*1.*	*1*
toringoides	14923	scion Cph.		
the following are all Pyrus pashia:*	*14816*			
	15043		26	
	15090			
see Sorbus koehneana *	14987	scion Cph.		
Meconopsis racemosa	13627		25	
punicea	13642	some plants		
integrifolia	13651	some plants		
Nitraria schoberi			10	
Philadelphus pekinensis var. *kansuensis*	13687		225 coll. as Deutzia by Rock	
	15076		1	
looks like Rehder's *incana*, exc. flwr. is scented, and 2cm. broad(17-6-34)	15046		1	
Picea asperata	15045			2
	15065			3
	15080			2
	15092		25.	5
wilsonii	14964			7
	14975			7
Picea asperata	15021			2
Picea asperata	15048		15.	3
Picea asperata	15068			3
supposedly *Abies faxoniana* ?	14989			8
Pinus armandii	13643		1	
Plagiospermum see *Prinsepia* *				
Podophyllum emodi	14901		ca. 10	
Potentilla fruticosa var. *dahurica*	13673		1	
Primula tangutica	13619		20illustrated by A.O.	
chionantha	13656		20	
Primula chionantha forma?	14920		a few	
Prinsepia uniflora	14957		10	
Prunus salicina	13527		1	
	14909	1 graft in H IV		
padus var. *commutata*	13570	scion, Cph. under the same number, Rock sent *Rosa sweginzowii*		
	14893		1.	1
tangutica	14889		1.	1cutting, Cph.6-34

		from Aksel Olsen's nursery 1928	from Cph. Bot. 1929	from Bang Århus 1929
*Pyrus pashia** see 15054		13054*	must be 15054, scion, Cph., 1936	
ussuriensis		13499	scion, Cph.	
pashia		14816	see also *Malus* 14816*	
		15043	26?scion, Cph.	
		15054*	called 13054, scion, Cph.	
		15090	1, not received?	
Rhamnus leptophylla var. *scabrella*		13608	20	
Rhododendron rufum		13599	20	
		13601	125	
		13613	115	
		13628	35	
		13643	175	
		13645	85	
		13647	90	
		13649	60	
		13650	240	
		13678	20	
		13680	200	
		13684	50	
		13691	50	
		13692	40	
		13693	150	
		13696	175	
		13697	400	
		14928	150	
micranthum		15004	5	
przewalskii		13612	400	
		13629	550	
		13677	350	
		13679	300	
		13681	280	
		13685	0	
		13694	200	
colletum		59073	5	
eclecteum var. *brachyandrum*		59112	50	
dead		59125	0	
dead		59126	18	
ecleteum bellatum?		59488	from Hillier	
dryophyllum		59135	22	
crinigerum		59183	12	
wardii		59237	3	
		59253	15	
		59530	8	
		59533	4	
hippophaeoides		59241	45	
eritimum		59251	180	
		59252	*175*	
racemosum		59258	80	
fulvoides from Hillier		59495		
		59518	*4*	
		59521	1	

		from Aksel Olsen's nursery 1928	from Cph. Bot. 1929	from Bang Århus 1929
Ribes stenocarpum	13197	'gooseberry'	1	
meyeri	1358	'currant'	1	
giraldii ex. 14953	15953	cutting, Cph.		
Rosa omeiensis	13590	scion, Cph.	1	
wilmottiae (glaucous lvd.)	13591		1	
(red lvd.)	14912		1	
sweginzowii (superba)	14903	deleted		
sweginzowii	14927			
Rosa sweginzowii	14988	(deleted)		
Rubus ideaus var. *strigosus*	13553		1	
amabilis	13581		30	
Sibirea laevigata	13595		1	
var. *angustita*			1	
Sorbaria arborea var. *glabrata*	13670	cutting, Cph., June, 1934		
Sorbus koehneana	13477		1	
	13524			
	14987	(deleted)	35	scion, Cph.
tapashana	13532	scion, Cph, June, 1934		
hupehensis var. *aperta*	13479		1	
prattii	13540			
Spiraea gemmata	13594			
alpina	13689	cutting, Cph.		
longigemmis	13690	(Pruhonice)		
wilsonii	14982		1	
Syringa microphylla	13698	(Pruhonice)		
oblata var. *giraldii*	15058		35	
	15063		*10*	*2*
pekinensis	15070		15	
Tilia chinensis	13486	scion, Cph.		
	15001	resembles Hillier's *chinensis*	1?	1
Viburnum glomeratum	13518	cutting, Cph., June, 1934		
betulifolium	15001		1	1
	15012		10?	1
	15013		10?	1 (maybe 15012?)
	15028			2
var. *aurantiacum*	14971		1	

This table is a nearly exact translated copy of Aksel Olsen's handwritten list of the Rock collections which he raised from the seed sent to him by the Copenhagen Botanic Garden in 1926-27. Olsen's hand is quite as chacteristic as his drawings: the letters are millimetre size, there are emendations of emendations, and a number of appended notes, all crammed into quarto-sized paper and neatly written and ruled. This explains the repetition of the plant names in different contexts. The list is a record of which plants he raised from seed, how many germinated, how many survived the first years, how they developed, and how they compared with the same

plants from other sources (Kew, Copenhagen, or other Danish gardens). When used in connection with Olsen's other source material, such as the *Kildeliste*, and his plant study catalogue, the value of this table becomes immediatly apparent. I know of no other nurseryman who exercised such care and thoroughness with wild collected seed.

It is interesting to note that Olsen grew seed of plants which he seemingly subsequently did not later offer for sale, perhaps because they failed him later on, or because he was waiting to make a qualified judgement as to their suitability for the Scandinavian climate. Many of these however were planted in his second geographical garden, *Syvdalen*, next to the nursery in Kolding. Considering that Olsen, D.T. Poulsen, and later other nurseries were raising Rock's plants, together with the Copenhagen botanic garden, the Forestry botanic garden, Aarhus, and the Arboretum, Hørsholm, and all the institutions in Sweden, then it is obvious that Rock's plants were subjected to a thorough test under Scandinavian conditions.

APPENDIX III

Part 1
Location of Rock Plants in Scandinavian Collections 1991[1]

Conifers

Plant Name	Rock number	Collection [a2]
Abies fargesii var. *faxoniana*	13422	1
	13437	* 3 1
	13440	1
	13444	* 1
	13445	this plant was drawn by A.O.
	13447	two trees in this grex 1
	13466	* 1
(Edinburgh, *fargesii*)	14989	* 1
	15009	1
	15081	1
	15082	* 1
	15084	* also F.B.G. 1
var. *sutchuenensis*	13435	1
var. *sutchuenensis*	13450	1
var. *sutchuenensis*	13467	* 1
var. *sutchuenensis*	15020	* and F.B.G. 1
recurvata	*15087*	1
	15088	and F.B.G. 1
Larix potaninii	25270	Edinburgh
Picea asperata	13431	1
	13963	very blue, a grex of 3 trees, plus 1 graft 1
	15065	grex of 3 trees, plus 1 graft and 1 seedling 1
	15080	1
Picea asperata	15092	grex, some very blue, 3 trees 1

At the Arboretum in 8 (Bjuv) K. E. Flinck has several *P. asperata*, as does the botanic garden 2, but without Rock nos.

wilsonii	14964	grex, 3 trees 1
	15064	grex, 3 trees 1
	15048	(Edinburgh), and 1
Pinus armandii (better in 1, 2 grafts of the original in	13463	F.B.H., than in 2, an original, but dying) 1,2
tabulaeformis	13449	in F.B.H. 1

Deciduous Trees and Shrubs

Acanthopanax giraldii	14866	9
leucorrhizus	15023	dying 2
Acer caudatum var. *multiserratum*	15010	drawn by A. O. 2
davidii	15033	2
pictum var. *parvifolium* (*mono*)	15000	5?
tetramerum var. *betulifolium*	?	large trees in 1,2, and 3, probably Rock

Conifers

Plant Name	Rock number	Collection [a2]
Aralia chinensis var. *nuda*	15085	see text, *very worthy* ... 6, 8, 9
	14825	? ... 5?
Berberis diaphana	13574	... 1, (5) ?
kansuensis	14899	... 9
vernae	14943	... 9
Betula albo-sinensis	15083	... 1
	?	... 9

there are plants of *albo-sinensis* growing in nearly all the collections, most probably Rock's

var. *septentrionalis*	?	2 trees ... 9

This birch is also in 1, (F.BG.), 3, 4, 5, 6. 7, and 8, withour number. See[4]

(sown by A.O. as *japonica* var. *szechuanica*)	14916 a	graft ... 1
var. *septentrionalis*	14827 ?	a very lovely old tree ... 5
japonica var. *szechuanica*	?	... 9
	?	a scion from A.O., grafted in 1948 ... 1
Betula japonica var. *szechuanica*	14916[5]	
Caragana jubata	?	'Columnaris'? ... 9
Caragana maximowicziana	13538	... 2, 9
Celtis bungeana	13503	? ... 2 ?
Clematis aethusifolia	15008	... 2
Cornus macrophylla	13483	... 9
	14662	... 2
Cotoneaster[6]		
adpressa (*nan-shan*)	13535	... 9
	?	... 9
horizontalis	13478	... 1,2
multiflorus	?	... 9
Crataegus kansuensis	?	... 3
**[7]	14947	? ... 1,7
Euonymus alata var. *aperta*	14978	... 2
phellomana	15072	... 2
Hemiptelea davidii	?	Rock ? ... 9
Hydrangea breschneideri	13602	... 9
	?	2 plants ... 5
Iris ensata	13637	? ... 9
Lonicera chrysantha var. *longipes*	15022	2 other plants in 9 without nrs. ... 9
coerulea var. *edulis*	1355	Edinburgh
deflexicalyx	14891	... 2,9
ferdinandii	?	... 9
heterolobata	14890	... 2
	?	... 9
szechuanica	14810	... 2
Lycium chinensis	15094?	... 2
Malus baccata	13502	... 9
kansuensis	13497	... 2
**	13497	? ... 2
kansuensis x *toringoiedes*	14925	... 9
toringoides	14923	... 2
**	?	seed ... 1
transitoria	13539	poor specimen. ... 2
	?	... 9

Conifers

Plant Name	Rock number	Collection [a2]
Ostryopsis davidiana	13513	2
	?	9
Paeonia suffruticosa	no nr.	several plants at each place 1, 8, 9
Philadelphus pekinensis var. *kansuensis*	13659	9
Philadelphus pekinensis var. *kansuensis*	14926	9
	13687	? 5
	15046	Edinburgh
	?	8
Potentilla fruticosa var. *dahurica*	13673	2 plants 9
Potentilla fruticosa var. *parvifolia*	13672?	9
Prinsepia uniflora	13504	2 plants 9
	14957	(Edinburgh = var. *serrata*) 2
Prunus salicina	13527	Morton Arboretum
setulosa	12432	9
Pyrus pashia	15043	9
	?	3
	14816	Morton Arboretum, not *pashia*
Rhamnus leptophylla var. *scabrella*	13608	nr. unknown at 9 2, 9
Rhododendron przewalskii	13681	F.B.G. 1
	?	5?
rufum	?	2, 8
	?	9
	13649	Rhododendron Species Foundation 78/040
Ribes giraldii	14953	2 plants, 9, 1 nr. unknown 2, 9
stenocarpum	13197	2
Rosa bella	13293	9
davidii	13570	A 2
omeiensis	?	very hardy 8
sweginzowii	18572	9

See also text, *Rosa*.

Sorbaria arborea var. *glabrata*	13670	2, 9
Sorbus hupehensis var. *aperta*	13479[8]	2,4
koehneana	14987?	[9]
Spirea gemmata	13594	2, 9
longigemmis	13690	(9 = f. *pubescens*, 2 = *rosthornii*, several plants) 2, 9
uratensis	15049	9
wilsonii	14982	9
Syringa pekinensis	13506,	13507, 15070 all Morton Arboretum
Tilia chinensis	13484	2
Viburnum betulifolium	?	A. O. Rock, 1956 8
var. *aurantiacum*	14971	Edinburgh
glomeratum	13518	Edinburgh

Part 2
Rock Plants in Various Locations in Scandinavia[10]

1. Arboretum, Hørsholm

Source: Archives and protocol of the Arboretum and Forestry Botanic Garden, Charlottenlund.

Conifers

Abies fargesii var. *faxoniana*
var. *sutchuenense*
recurvata

Picea asperata
wilsonii
*likiangensis** (A. O. 1948)
*likiangensis** (F.B.H. scion)

Pinus armandii
tabulaeformis

Deciduous Broad Leaved

Acer maximowiczii
tetramerum var. *betulifolium*

Betula albo-sinensis
var. septentrionalis
japonica var. *mandschurica*

Hydrangea bretschneideri

Malus kansuensis see footnote 7
toringoides see footnote 7

Paeonia suffruticosa 'Rock's Form'

Rhododendron przewalskii

2. Botanic Garden, Copenhagen

Source: F. Arnklit, Archives, and protocol of the Botanic Garden, Copenhagen.

Conifers

Abies fargesii var. *faxoniana*
var. *sutchuenense*
recurvata

Picea asperata
wilsonii

Pinus armandii

Deciduous Broad Leaved

Euonymus phellomana

Lonicera deflexicalyx
fernandii

Malus kansuensis
toringoides
transitoria

Deciduous Broad Leaved

Acer caudatum var. *multiserratum*
davidii
tetramerum var. *betulifolium*

Betula albo-sinenesis
var. *septentrionalis*
japonica var. *szechuanica*

Caragana maximowicziana

Clematis aethusifolia

Cotoneaster horizontalis

Euonymus alata var. *aperta*

Ostryopsis davidiana

Rhamnus leptophylla

Rhododendron rufum?

Ribes giraldii

Rosa davidii
sweginzowii?

Sorbaria arborea var. *glabrata*

Sorbus hupehensis var. *aperta*

Spirea gemmata
longigemmis

Tilia chinensis

3. D.T. Poulsen's Nursery

Source: see letter nr. 6

Conifers

Abies fargesii var. *faxoniana*
var. *sutchuenense*
recurvata

Picea asperata[11]
'Notabilis' Rock ?
'Louisiana' Rock ?
likiangensis
wilsonii

Deciduous Broad Leaved

Acer tetramerum var. *betulifolium*
Betula albo-sinensis var. *septentrionalis*

Crataegus kansuensis

Pyrus pashia

4. Arne Vagn Jacobsen's Nursery

Source: Personal discussion with owner

Conifers

Pinus armandii

Deciduous broad leaved

Acer tetramerum var. *betulifolium*

Aralia chinensis var. *nuda*

Betula albo-sinensis var. *septentrionalis*

Cornus macrophylla Rock's?

Crataegus kansuensis Arboretum, Hørsholm probably not Rock's

Euonymus phellomana Copenhagen Botanic Garden

Hydrangea bretschneideri Arboretum, Hørsholm

Lycium chinensis ? Rock's?

Malus toringoides Aksel Olsen
transitoria Aksel Olsen

Prinsepia uniflora Botanic Garden, Copenhagen

Rosa bella
sweginzowii

Sorbus hupehensis var. *aperta*
fruticosa
prattii Aksel Olsen

Syringa pekinensis Botanic Garden Copenhagen

Tilia chinensis Botanic Garden Copenhagen

5. Forest Botanic Garden Århus

Source: Protocol, Forestry Botanic Garden, Århus, and survey

Deciduous Broad Leaved

Acer maximowiczii
pictum var. *mono*
tetramerum var. *betulifolium*

Ailanthus altissima (1928) Rock?

Aralia chinensis var. *nuda*

Berberis diaphana
parviflora
vernae

Betula albo-sinensis
var. *septentrionalis*

Caragana jubata

Cotoneaster acutifolius
adpressa
horizontalis
multiflora var. *calocarpa*
obscura
racemiflora

Hydrangea bretschneideri

Lonicera bella
coerulea var. *edulis*
ferdinandii
deflexicalyx
Lonicera
syringatha

Lycium chinensis

Malus toringoides
transitoria

Philadelphus pekinensis

Prinsepia uniflora?

Rhamnus leptophylla var. *scabrella*

Rhododendron przewalskii (Børgesen, 1931)
rufum

Rosa omeiensis var. *pteracantha*
sweginzowii?

Sorbus hupehensis var. *aperta* ?
koehneana Cph., 1932, A.O. 1940, 1942
prattii?

Tilia chinensis?

6. and 7. The Geographical Garden and Aksel Olsen's Nursery

For information on Rock's plants in these collections see Lange (1953).

8. The Karl-Evert Flinck Arboretum

Source: Personal discussion with K. E. Flinck, K. Lorentzon, and survey.

Conifers

Picea asperata
Pinus armandii

Deciduous broad leaved

Acer maximowiczii

Aralia chinensis var. *nuda*

Betula albo-sinensis var. *septentrionalis*

Paeonia suffruticosa 'Rock's Form'

Philadelphus pekinensis

Rosa omeiensis var. *pteracantha*

Viburnum betulifolium

9. The Bergius Botanic Garden, Stockholm

Source: Henni Wanntorp, curator of Hortus Botanicus Bergianus.

Acanthopanax giraldii

Aralia chinensis var. *nuda*

Berberis kansuensis
Berberis vernae

Betula albo-sinensis
Betula albo-sinensis var. *septentrionalis*
Betula platyphylla var. *japonica*

Caragana maximowicziana

Malus transitoria

Ostryopsis davidiana

Paeonia suffruticosa

Philadelphus pekinensis var. *kansuensis*

Potentilla fruticosa var. *dahurica*
Potentilla fruticosa var. *parvifolia*

Prinsepia uniflora

Cornus macrophylla

Cotoneaster multiflorus
Cotoneaster nan-shan

Hemipetala davidii Rock?
Hydrangea bretschneideri

Iris ensata var. *chinensis*

Lonicera deflexicalyx
Lonicera fernandii
Lonicera heteroloba
Lonicera chrysantha var. *longipes*
Malus baccata
Malus kansuensis x *toringoides*

Prunus setulosa

Pyrus pashia

Rhamnus leptophylla

Ribes giraldii

Rosa bella
Rosa sweginzowii

Sorbaria arborea var. *glabrata*

Spirea gemmata
Spirea longigemmeis
Spirea uratensis
Spirea wilsonii

10. The Morton Arboretum

Source: See letter nr. 7

Picea asperata

Cotoneaster multiflora

Euonymus phellomana

Prinsepia uniflora var. *serrata*

Prunus salicina

Pyrus sp.

Syringa pekinensis

1. This list (in two parts) comprises the living plants surveyed by the author, or by others at his request, in various collections in Scandinavia, or in some instances, grown by Scandinavian nurseries (usually without a Rock number). Wherever the Rock number has been located it is listed here with the plant. Some plants that are very likely Rock's, but unauthenticated, appear in the list noted as such. The first list is arranged by plant and the second by location.

2. The collection numbers refer to the list at the back of this appendix of the Scandinavian institutions and firms growing Rock's plants. They are: *1. the Arboretum, Hørsholm* (including the Forestry Botanic Garden, Charlottenlund) *2. Botanic Garden, Copenhagen, 3. D.T. Poulsen nursery 4. Arne Vagn Jacobsen nursery 5. Forestry Botanic Garden, Århus 6. Geographical Gardens, Kolding 7. Aksel Olsen nursery 8. the K.E. Flink Arboretum, Bjuv, Sweden 8. Bergius Botanic Garden, Stockholm.*

3. Numbers marked with an * are original introductions that are also found as grafts from 1962. F. G. Christensen, formerly at the Arboretum, Hørsholm, took scions of these numbers in order to perpetuate the trees, and to experiment with different rootstocks. These grafts are very well developed and attractive trees.

4. Aksel Olsen sowed the following nos. : 14823, 14969, and 14916 (which when he saw that it was not what it was supposed to be, he divided up into 2 lots, according to bark colour. He also had *sic.* 13613 and 15083 from Prouhonice, and another number from Grootend. It is impossible to say for sure which of these became the tree he finally selected, and that A.V. Jacobsen grows, since with time Olsen lost interest in the *Betula* numbers, *possibly because 13613 is an Abies* according to the Arnold Arboretum, and 14916 was not correct either. But he did select 14916 a (his numbering) in the end as the tree with the reddest bark. The fine tree in Århus supposedly has a Rock number 14827 which apparently is not at all a birch. The confusion is unfortunate, but of no great importance since the plants do exist, and there are also other cvrs. grown now of undeniable beauty.

5. In spite of the mix up on Aksel Olsen's nursery, 14916 in the Botanic Garden, Copenhagen, is *B. japonica* var. *szechuanica.* The original tree was cut in half a few years ago to make way for a guard's gate. There is also a graft of this tree in the same garden.

6. Aksel Olsen grew several of Rock's *Cotoneaster*, and illustrated a number of them. Bertil Hylmö has collected all the Rock plants he could find in Scandinavia and the Arnold Arboretum, and has revised them. He has nos.: 13535, 14897, 22291, 14834, and Bergianska 53, from the Arnold Arboretum, (no Rock no.).

7. H. Irens-Møller, a botanist from Copenhagen worked at the Arnold Arboretum after the Second World War, and supplanted Rock material in Denmark that was wanting from Sargent's original distribution. He sent propagation material to locations 1, 2, and 7, usually scions, but sometimes seed. Plants marked with * * are of this origin.

8. See text for information about the *Sorbus* in Copenhagen. The original tree blew down, and the grafts that were taken were apparently mixed up in some way. Only one of the trees resembles the original. The original collection has the botanic garden nr. 6342 B-12.

9. See text under *Sorbus*. B. Hylmö, Bjuv, wrote in a letter that H. McAllister at the Liverpool Botanic determined the material he sent as *S. fruticosa*. This was supposedly from Aksel Olsen's nursery in 1955. At the same time Olaf Olsen, then director of the Copenhagen Botanic Garden aquired the same cultivar for the Botanic Garden, as did K. E. Flinck in 1956. Aksel Olsen grew originally Rock 13477, 13524, as well as a scion from the Copenhagen Botanic Garden of 14987. In all likelihood Hylmö 's material is from 14987. Rock 13450, also in the Copenhagen Botanic Garden, was according to A. Olsen and the Arnold Arboretum *S. prattii*, but the botanic garden determined theirs to be *S. koehneana*.

10. This continuation of Appendix II lists the various locations with the Rock plants they grow. Locations in North America that have responded to inquiries for information are also listed. See the end of this appendix for the addresses of the various growers. Plants marked with an * are conjecturally Rock's collections, the conjecture based on the available records of their origin.

11. In a letter (see ref.letter nr. 6), N. D. Poulsen related that the Tree Improvement Station, Humlebæk (now the Danida Forest Seed Centre) has together with the Arboretum, Hørsholm worked extensively with *P. asperata* that is based on Rock's *P. asperata* from the Arboretum's collections. There is supposed to be a very good collection of *P. asperata* hybrids that show marked hybrid vigour- especially the hybrids *P. asperata* × *sitchensis*, *P. asperata* × *glauca*, and *P. asperata* × *omorika*. (per. comm., Erik Kjær, Humlebæk).

DANSK SAMMENDRAG

Denne opgave er indleveret som afslutning på uddannelsen som havebrugstekniker ved Sveriges Lantbruksuniversitet, Alnarp. Vejleder på opgaven var Dendrolog Kenneth Lorentzon, Institutionen för Trädgårdsvetenskap.

Artiklen viser resultaterne af uddelingen af det frømateriale, der blev indsamlet for Arnold Arboretet, Harvard Universitetet, af den kendte amerikanske »plantejæger« J.F.Rock i årene 1924-27, i Quinghai og Gansu provinserne i det nordvestlige Kina. Den daværende direktør for Arnold Arboretet, C.S.Sargent, udsendte Rock for at udforske området, og indsamle plantemateriale til arboretets levende samling og herbarium. Målet var at fastlægge nordgrænserne for de arter, som Wilson og andre havde udforsket tidligere, og at indsamle planter, som kunne trives i det nordlige Nordamerika og Nordeuropa. Denne del af Kina var på den tid præget af uroligheder – sult, sygdomme, røveri og krige, som gjorde Rocks opgave næsten umulig. Han slap dog med livet og resultatet af to et halvt års indsamling i behold, efter at have været vidne til mange dødsfald, overgreb og skudvekslinger med diverse røverbander og fjendtlige stammer, og endelig den røde hærs indtog i Kina fra nord og øst.

Rocks studium af dette områdes flora er nok den mest grundige og omfattende, der er foretaget. Han arbejdede i felten i flere måneder og indsamlede mange tusinde herbarieark og frøportioner, og tog flere hundrede fremragende fotografier – ikke kun af de planter, han samlede frø af, men også af deres omgivelser. Denne samling med hans feltnotater og kort er stadig af stor betydning for forståelsen af floraen i denne del af Kina.

I Skandinavien har indsamlingerne resulteret i flere værdifulde bidrag til have- og skovbrug. Følgende taxa fra Rocks indsamlinger er værdifulde p.g.a. hårdførhed, skønhed eller praktisk værdi: *Abies fargesii* var. *faxoniana*, *A.f.*var. *sutchuenensis*, *A. recurvata*, *Picea asperata*, *Betula albo-sinensis* var. *septentrionalis*, *Paeonia suffruticosa* ssp. *rockii*, *Exochorda giraldii*, flere arter af *Rosa*, *Sorbus aperta*, *S. fruticosa*, *Malus kansuensis*, *Caragana jubata*, *Acer maximowiczii*, *A. tetramerum* var. *betulifoium*, *Tilia chinensis*.

Udbredelsen af disse planter skyldes ikke mindst den danske planteskoleejer Aksel Olsen, Brændkjærhøj, Kolding. Han var blandt de plantedyrkere, som Botanisk Have i København fordelte Rocks frø til i 1926-27. Olsen og hans kollegaer, D.T.Poulsen, N.J.Bang samt Axel Lange og Syrach Larsen m.f., var alle ivrige dyrkere af Sargents gave. På grund af Olsens botaniske interesse og særlige evner som gartner og tegner, samt hans ufatteligt grundige registrering, er det muligt i dag at afdække oprindelsen til mange af de planter fra Rocks ekspedition, som står rundt omkring i offentlige og private samlinger. Faktum er, at flere af planterne er bevaret i Skandinavien end i Arnold Arboretet og mange andre af de institutioner i Nordamerika, som Sargent sendte frø til.

Det viste sig at være næsten sidste chance for at indsamle og studere materialet til denne opgave. Mange af planterne har levet en anonym tilværelse, især i de offentlige institutioner, med untagelse af Arboretet i Hørsholm og Botanisk Have i København. I flere tilfælde er det for sent at finde ud af planternes oprindelse. Ikke alene planterne, men også uerstatteligt arkivmateriale er ved at gå tabt for Rock og Olsens efterfølgere, som ikke længere sætter deres indsats tilstrækkelig højt. Disse mænds arkivmateriale indeholder så enorme mængder af botanisk og hortikulturel information og kulturel værdi, at det bør studeres og katalogiseres, inden det er for sent. Nærværende arbejde er en begyndelse, som forhåbentlig vil blive fortsat af andre.

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Letters

A large part of the source material for this project is made up of the correspondance between Rock, Olsen and their colleagues, and of replies to inquiries made by the author regarding information about the plants or on Rock and Olsen. The letters are listed in the order that they appear in the text.

1. Rock to Burkill, 6-7-51, R. B. G., Kew, Burkill, pp. 235 and ff.
2. Lancaster to the author, 14-4-91.
3. Rock to Stern, 24-8-38, R. B. G., Kew, Stern, pp. 209-211.
4. Sargent to Aksel Lange, 3-12-26, Archive, Botanic Garden, Copenhagen.
5. Rock to Syrach Larsen, 3-11-59, Archive, Arboretum, Hørsholm.
6. Poulsen to the author, 29-4-91.
7. Stieber to the author, 12-3-91.
8. Rock to Burkill: see 1.
9. Hylmö to the author, 6-3-91.
10. Aksel Olsen to Olaf Olsen, -68.
11. Rock to Burkill, -47, Royal Botanic Garden, Kew, Burkill, pg. 231.
13. Henni Wanntorp to author, 3-26-91.

a. List of Collection names and location by number:

1. Royal Veterinary and Agricultural Univesity, Arboretum, DK-2970, Hørsholm, Denmark (including the Forestry Botanic Garden, Charlottenlund).
2. Copenhagen University Botanic Garden, Øster Farimagsgade, 2-B, DK-1353, Copenhagen K.
3. D.T. Poulsen Nursery, Hillerødvej 49, DK- 3480, Fredensborg.
4. Arne Vagn Jacobsen Nursery, Fåborgvej 42, Glamsdalen, DK-5620, Glamsbjerg.
5. Forest Botanic Garden, Aarhus, Skovriddervej, DK-8000 Århus C.
6. The Geographical Garden, DK-6000 Kolding.
7. Aksel Olsen's Nursery, 'Brændkjærhøj', Chr. d. IV's vej, 13, DK-6000 Kolding.
8. The Royal Agricultural and Horticultural University, Institute of Horticulture, Horticum, Box 55, S-230 53, Alnarp (including the Karl Evert Flinck Arboretum, Bjuv).
9. Stockholms University, Bergianska Botaniska Trädgården, Box 50017, S-104 05, Stockholm.

The author regrets not having contacted institutions in Norway and Finland for information on Rock plants in those countries, and wishes to thank a) The Morton Arboretum (which was associated with the Arnold Arboretum in Sargent's day, and responsible for some of the distribution of Rock's seed to institutions in northern Europe) b) The Rhododendron Species Foundation, Federal Way, Wa. USA., and c) The American Rhododendron Society, for providing essential source material on Rock as well as information on Rock's plants in their collections.

BORSHOLM PINET

af
Søren Ødum
Arboretet, 2970 Hørsholm
&
Alix og Gunnar Seidenfaden
Borsholmgård, 3100 Hornbæk

Pinetets tilblivelse og beliggenhed

Under den danske forst-delegations rejse gennem Kina i efteråret 1974, hvor vi (forfatterne, Carl Holten Andersen, Hakon Frølund, Bent Søegaard) besøgte mange forskellige lokaliteter lige fra de sidst bevarede rester af urgammel skov omkring Dailing i Sungariflodens område i Manchuria (Heilongjiang) til de nyere plantningsforsøg, naturparker og botaniske haver i de sydlige provinser, gjorde de stort anlagte parkanlæg omkring Hangchow et stort indtryk på os. Særlig interessant var et kuperet område beplantet for vel en snes år siden med forskellige arter af nåletræer. De kinesiske skovfolks grundlæggende tanke var her at demonstrere, hvorledes de individuelle træer udvikler sig, når de får lov at udfolde sig frit til alle sider og ikke som i vores egne plantager bliver

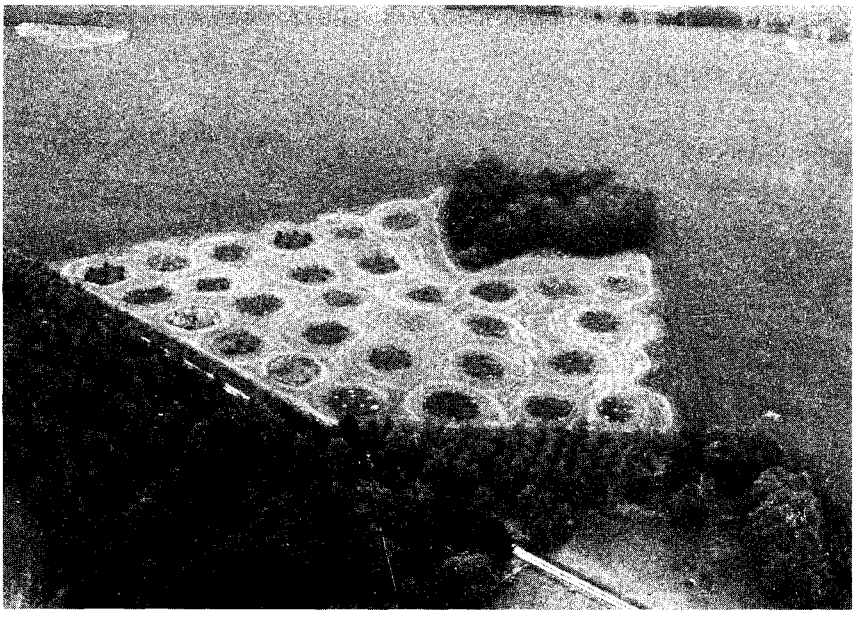

Fig. 1. Fly-foto af pinetet set fra sydvest få år efter anlæggelsen. Fot. Annette Seidenfaden 1980.

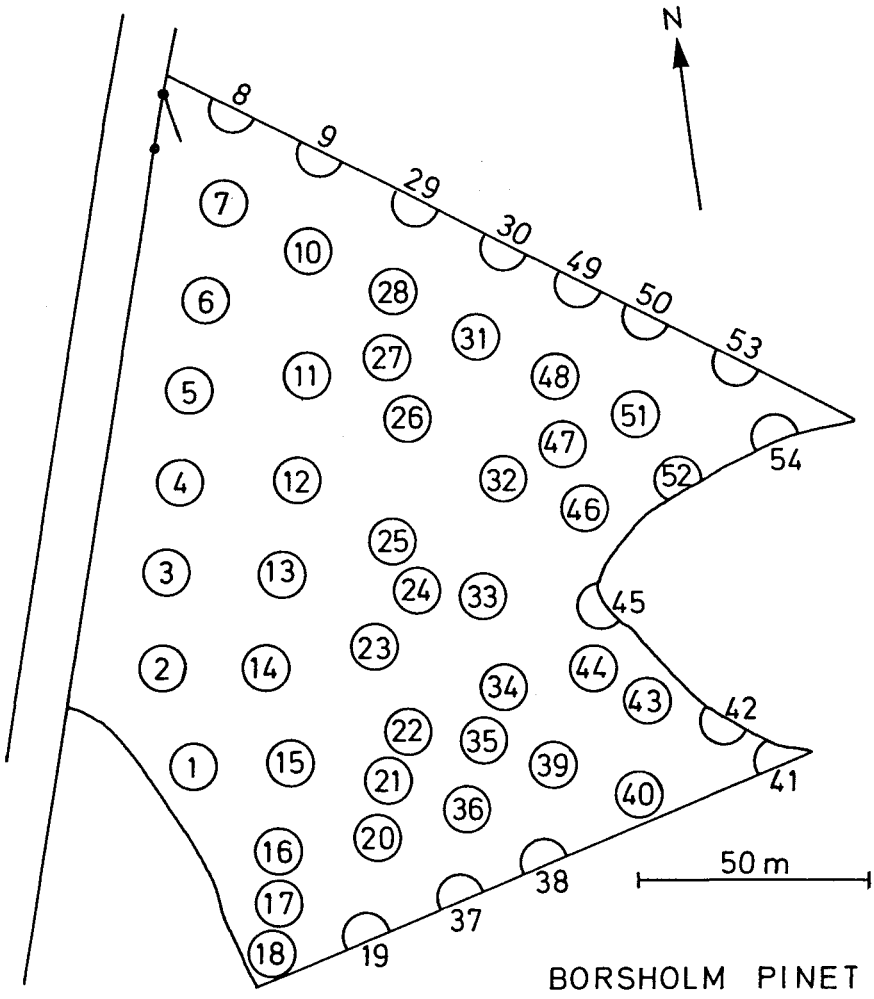

Fig. 2. Kort over pinetet med angivelse af grupperne. Kaj Svendsen del.

plantet i tætte snorlige rækker, hvor løvet kun udvikler sig i toppen, og forgreningen nedefter hæmmes og dør bort til fordel for et ensartet, salgbart produkt af slanke stammer egnet til at gå let gennem savskæreriet.

Den tanke opstod, at det kunne være morsomt i mindre format at se, hvordan forskellige nåletræer indplantet i vort eget hjemlige område kunne komme til at se ud, hvis de enkelte træer fik adgang til lys og luft og fri udfoldelse. Samtidig var der en mulighed for at afprøve arter, der ville vise evne til at udvikle sig og overleve i det nordsjællandske klima, således at de kunne anbefales til danske haver og parker.

I vinteren 1974/75 drøftede vi med C. Th. Sørensen muligheden for at

finde et passende areal, og det vedtoges at inddrage nogle svagt kuperede marker syd for gården, ca. 4 tdr. land lige nord for Risby Vang, som forbinder skovområderne Risby og Horserød Hegn. Området er mod vest let beskyttet af et kratområde med smådamme, mod øst af en træbevokset stor gammel mergelgrav. C. Th. Sørensen afleverede i maj 1975 en skitseplan for plantningen. Han forestillede sig en plantning i 27 grupper, hvor der indenfor en cirkel på 10 meter i diameter kunne anbringes 7 planter. Han tænkte sig, at når planterne voksede til, kunne halvdelen fjernes, så resten kunne udvikle sig frit. (Fig. 1, Fig. 2). I samråd med Arboretet i Hørsholm (Søegaard og Ødum) fik vi i løbet af efteråret klargjort arealet og udarbejdet en artsliste; de første udplantninger fandt sted i september til december 1975. Som beskyttelse af de unge planter mod ukrudt og til forbedring af fugtigheden, blev hvert træ omkredset af et godt lag barkflis.

De første år led nogle arter skade ved rådyrenes fejning, så i 1977 blev der rejst vildthegn omkring arealet, og samme år blev der efterplantet for døde planter. Samtidig indrettedes der en del halvcirkler langs hegnene med hver ca. 3 eksemplarer af nye arter. Gennem de følgende år er der nu og da efterplantet eller tilført flere arter. Som i ethvert plantningsforsøg har vi måttet konstatere, at enkelte arter har svært ved at klare sig, så kun et enkelt eksemplar i den oprindelige cirkel er i live. Andre arter er så plantet ind, hvorfor nogle cirkler ikke længere følger den oprindelige plan med kun én art i hver cirkel.

Generelt burde der formentlig have været ofret mere arbejdskraft på at holde mere rent mellem planterne. Bortset fra at holde græsvæksten nede ved at køre en Tårup mellem cirklerne et par gange om året, har området imidlertid fået lov til at passe sig selv. Vi har endnu ikke fundet den bedste måde til at forsyne de enkelte træer eller grupper med navneskilte. Flere typer af etiketter har vist sig kun at kunne holde et par år. Muligvis ville en anvendelse af støbte skilte være en fordel, men på den anden side synes vi ikke, de bør syne for meget i terrænet.

Som det vil fremgå af følgende liste, er der i øjeblikket ca. 55 arter og 62 numre. De mindre af dem fylder ikke meget i landskabet endnu, men mange, der er plantet i 1970'erne, begynder nu at tage form og give et indtryk af, hvordan pinetet vil tage sig ud om en snes år. Man ser allerede nu, hvordan hver art får sin egen karakter i form og farve såvel som de individuelle karakterer i skudbygning, løv og kogler. Da langt de fleste grupper udgøres af frøformerede planter fra indsamlinger i naturen, afspejler de også lidt af den individuelle variation i populationerne.

I den følgende liste over alle arter i de enkelte cirkler gives der oplysning om samtlige træers navne, alder og proveniens. Det vil ses, at frøene er kommet fra snart sagt alle dele af den nordlige halvkugle. Amerika er

repræsenteret ved arter fra Alaska og Canada (Brit. Columbia, New Brunswick) og flere af de nordamerikanske stater (Colorado, Arizona, Wyoming, South Dakota, Idaho, Montana, California, Oregon); Europa er repræsenteret af arter fra Norge til Balkan. Fra Asien er der arter fra Tyrkiet, Ural og Pakistan til Sibirien, Korea og Japan og mange af Kinas provinser.

Adgang til pinetet

Alle er selvfølgelig velkomne til at aflægge et besøg og vandre i området, når blot man holder indgangslågen lukket og undlader at knække grene af. Man kommer frem ved at følge markvejen en lille kilometer stik sydpå fra Borsholmgårds hovedbygning. Der kan parkeres i en græsrabat langs hegnets vestkant, lågen er i områdets nordvestlige hjørne. Fra enden af markvejen kan man gennem en åbning i stendiget komme ind til stierne i Horserød Hegn med kun få kilometers gåtur sydpå til Gurre Sø.

Oversigt over arterne og deres placering i grupperne (numrene angivet, se kortet fig. 2).

Abies balsamea 49
– *concolor* 28
– *homolepis* 26, 55
– *koreana* 25, 29, 40
– *lasiocarpa* 33, 47
– *procera* 23
– *sacchalinensis* 2
– *veitchii* 2
Calocedrus decurrens 33
Cedrus deodara 17
– *libani* 38
Chamaecyparis lawsoniana 48
– *nootkatensis* 11
Cryptomeria japonica 15
Juniperus chinensis 37
– *communis* 20
– *virginiana* 36
Larix decidua 31
– *gmelinii* 35
– *sibirica* 46
– *s.* var. *sukaczewii* 20
Metasequoia glyptostroboides 23
Picea breweriana 39
– *engelmannii* var. *glauca* 3, 22
– *glauca* 6
– *koyamai* 43
– *mariana* 50
– *meyeri* 41
– *orientalis* 14
– *pungens* 1
– *schrenkiana* var. *tianschanica* 21
– *smithiana* 52
Pinus aristata 9
– *banksiana* 17
– *contorta* var. *latifolia* 5
– *densata* 27
– *densiflora* 8, 24
– *heldreichii* 53
– *hwangshanensis* 45
– *jeffreyi* 30
– *koraiensis* 40
– *mugo* 19

1. *Picea pungens* Engelm., (Blågran). Sydl. Rocky Mts., USA. Opr.: Fairplay, 39°03'N, 106°01'W, 2900 m, Colorado, USA. Arboretet no. 392/71. Coll.: L. Feilberg & S. Ødum 1971. Sået 1974, plantet 1977. I de naturlige bestande, som kanter de tørre intermontane sletter, varierer de enkelte træers nålefarve fra næsten grøn til +/−blå, hvilket afspejles i denne trægruppe. De meget blå blågraner, der sælges i planteskolerne, er selekteret blandt frøafkom eller opformeret som podninger.

2. En lidt blandet gruppe, som oprindelig (1975) blev tilplantet med *Sciadopitys verticillata* (Thunb.) Sieb. & Zucc., (Parasoltræ), C-Japan, fra D.T. Poulsens Planteskole. Kun et individ har overlevet. Gruppen senere suppleret med *Abies veitchii* Lindl., (Veitch' Ædelgran), C-Japan, planteskole-materiale, og *Abies sacchalinensis* Mast. (Sachalin-Ædelgran), opr. Mt. Daireku, Yamabe, 800 m, Hokkaido, Japan; coll.: Nordisk Arboretudvalgs Japan-eksp. 1976; Arboretet no. 387/76.

3. *Picea engelmannii* (Parry) Engelm. var. *glauca* (R.Sm.) Beiss, (Blå Engelmanngran). Sydl. Rocky Mts., USA. Opr.: McNary, 34°05'N, 109°38'W. 2700-3000 m, Arizona, USA. Arboretet no. 383/71. Coll.: L. Feilberg & S. Ødum 1971. Sået 1974, plantet 1977. Engelmanngran er hovedtræart og danner skovgrænse i Rocky Mts. og Cascades Mts. i USA og det sydvestligste Canada. Mod nord er nålefarven grøn eller grågrøn, og i en bred overgangszone til hvidgran i nord forekommer hybridsværme med denne art. En forholdsvis brat overgang mod syd til den her plantede Blå Engelmanngran berettiger dens udskillelse som geografisk og morfologisk let erkendelig varietet. Udspringsfarven er markant stålblå.

4. *Pinus sylvestris* L., (Skovfyr). Europa-Asien. Fra D.T. Poulsens planteskole, plantet 1975. Oprindelsen er ikke kendt, men en overvejende del af det materiale, der produceres i Danmark, er af sydskandinavisk eller skotsk herkomst (Larsen 1983), og det her plantede parti kunne se ud til at være af sydnorsk herkomst.

5. *Pinus contorta* Loud. var. *latifolia* Loud., (Contorta-Fyr, Indlands-Contorta). Vestl. Nordamerika. Opr.: Bighorn Mts. 2700 m, Wyoming, USA. Arboretet no. 428/71. Coll.: L. Feilberg & S. Ødum 1971. Sået 1974, plantet 1977. Contortafyr er vidt udbredt og opdelt i et antal veldefinerede

geografiske varieteter (eller underarter). Kyst-varieteten er den i de vestjyske klitter almindeligt plantede, mens var. *latifolia* er udbredt fra Yukon i nord til Utah-Colorado i syd. Afkommet her fra en enkelt bestand udviser betydelig individuel variation.

6. *Picea glauca* (Moench) Voss, (Hvidgran) Nordl. Nordamerika. Opr.: Lead, Black Hills, 44°20'N, 103°50'W, 1400-1700 m, S. Dakota, USA. Arboretet no. 379/71. Coll.: L. Feilberg & S. Ødum 1971, sået 1974, plantet 1977. Fig. 3. I Black Hills forekommer Hvidgran på en skovklædt ø i »prærieha vet« langt syd for det sammenhængende udbredelsesområde fra Labrador til Alaska, og denne geografisk isolerede, tætkronede proveniens kan opfattes som var. *densata* Bailey.

7. *Pinus nigra* Arnold var. *austriaca* (Hoess) Asch. & Graebn., (Østrigsk Fyr). Europa – Lilleasien. Fra D.T. Poulsens Planteskole, plantet 1975.

Fig. 3. Gruppe 6 med *Picea glauca* fra Black Hills, Dakota. S.Ø. fot. 1. maj 1990.

Fig. 4. Udsigt fra nordlige del af pinetet mod Borsholmgård. Tv. gruppe 7 med Pinus nigra, th. gruppe 11 med *Chamaecyparis nootkatensis* og gruppe 10 med *Pinus sylvestris* var. *mongolica* og *Taxus baccata*. I baggrunden *Pinus aristata*. S.Ø. fot. 1. maj 90.

(Fig. 4). Den tætte, mørkegrønne krone er karakteristisk for denne geografiske varietet med udbredelse i de østlige Alper, Dolomiterne og dele af Balkan.

8. *Pinus densiflora* Sieb. & Zucc. Japan-Korea-NØ Kina. Opr.: Jiri-San, 35°19'N, 128°44'E, 700 m, Sydkorea. Arboretet no. 1089/77. Coll.: Nordisk Arboretudvalgs Korea-ekspedition 1976, sået 1977, plantet 1983. Denne art, der som Skovfyr kan få rødlig bark men har slankere, friskgrønne nåle, er sjælden i kultur i Europa og indtil 1976-eksp. vist kun som japanske herkomster. Her i Borsholm og i Arboretet har koreanske provenienser vist sig at være mere hårdføre end japanske.

9. *Pinus aristata* Engelm., (Rævehalefyr). SV-USA. Opr.: Echo Lake, 39°40'N, 106°36'W, 3200 m, Colorado. Arboretet no. 399/71. Coll. L.

Feilberg & S. Ødum 1971, sået 1974, plantet 1980. Nogle planter visnede efter udplantning; 2 tilbage i 1990. (Fig. 5).

10. *Taxus baccata* L., (alm. taks). Europa. Fra D.T. Poulsens Planteskole, plantet 1975. *Pinus sylvestris* L. var. *mongolica* Litv., (mongolsk skovfyr). Østlige Mongoliet og tilgrænsende USSR og Kina. Opr.: Hailar, 800 m, Indre Mongoliet, Kina. Arboretet no. 285/75. Coll. Chinese Academy of Forestry. (Fig. 6). Frøet hjembragt af Kina-delegationen 1974, sået 1975. Gruppen plantet 1980. Nåle ikke så blå som hos europæiske provenienser.

11. *Chamaecyparis nootkatensis* Spach, (Nootka-Cypres). Vestlige Nordamerika. Opr.: Digby Island, Brit. Col., Canada. Arboretet no. S.6012. Modtaget fra Canada. Sået 1967, plantet 1977. I danske haver plantes oftest stiklingeformerede planter med stærkt hængende skudsystemer fra

Fig. 5. Nordranden af pinetet med gruppe 9, *Pinus aristata* i forgrunden, i mellemgrunden tv. gruppe 29 med *Abies koreana* og th. gruppe 28 med *Abies concolor*. Bagved tv. gruppe 30 med *Pinus jeffreyi* og i midten gruppe 31 med *Larix decidua*. S.Ø. fot. 1. maj 90.

Fig. 6. Gruppe 10 med *Pinus sylvestris* var. *mongolica* fra N-Kina underplantet med *Taxus baccata*. S.Ø. fot. 1. maj 90.

hovedgrenene, hvor formeringsmaterialet er taget i kronen af ældre træer (herunder den selekterede klon 'Pendula'). Hos frøformerede planter som her ses forneden i kronen de juvenile, »buskede« skudsystemer.

12. *Pseudotsuga menziesii* Franco, (Douglasgran). Vestl. Nordamerika. Opr.: Stanley, 44°19'N, 115°08'W., 2200 m, Idaho, USA. Arboretet no. 397/71. Coll.: L. Feilberg og S. Ødum 1971. Sået 1974, plantet 1977. Denne indlandsherkomst har en mere beskeden årlig tilvækst end de i skovbruget normalt anvendte kystprovenienser, og nålefarven er mattere. Gruppen udviser stor individuel variation i skudbygning og kronformer.

13. *Pinus ponderosa* Laws., (Gul Fyr). Vestl. Nordamerika. Opr.: Darby, 45°45'N, 114°05'W, 1400 m, Montana, USA. Arboretet no. 405/71. Coll. L. Feilberg & S. Ødum 1971. Sået 1974, plantet 1977. (Fig. 7). Denne 3-nålede art er vidt udbredt fra Mexico til Canada og opdelt i et antal geografiske underarter eller varieteter. De lange, slanke, friskgrønne nåle er karakteristiske for de nordvestlige provenienser. Som gammelt får træet orangerød bark.

14. *Picea orientalis* (L.) Link, (Orientalsk Gran). Kaukasus-NØ Tyrkiet. Fra D.T. Poulsens Planteskole, plantet 1975. (Fig.7).

15. *Cryptomeria japonica* D.Don (Cryptomeria). Japan. Opr.: Uttosawa, Japan, af Arboretets udplantninger ved Isterødgård. Plantet 1975.

16. *Pinus peuce* Griseb., (Silkefyr). Balkan. Fra D.T. Poulsens Planteskole, plantet 1975.

17. *Pinus banksiana* Lamb., (Banksfyr). NØ-Nordamerika. Opr.: Corn Hill, New Brunswick, Canada. Arboretet no. S.6199. Coll.: Mark Holst. Sået 1975, plantet 1980. (Fig. 8). Gruppen bestod oprindelig af *Cedrus deodara* (Roxb.) Loud., (Deodarceder) Himalaya. Fra S. Th. Sørensens Planteskole. Plantet 1978. Et eksemplar tilbage 1990.

18. *Abies holophylla* Maxim., (Manchurisk Ædelgran). Korea og tilgrænsende Kina-USSR. Opr.: Kyebang-san, 37°47'N, 128°34'E, 1100 m, Sydkorea. Arboretet no. 106/77. Coll.: Nordisk Arboretudvalgs Korea-ekspedition 1976. Sået 1977, plantet 1983. Sjælden i kultur i Europa. Hårdfør. Lange, friskgrønne nåle. Ældre træer med rød, skællende bark på stammen af de kraftige grene.

19. *Pinus mugo* Turra, (Bjergfyr). C-Europa. Fra S. Th. Sørensens Planteskole, plantet 1978.

20. *Juniperus communis* L., (Alm. Ene). Europa. Planter af dansk oprindelse fra Arboretet, plantet 1975. Gruppen blev i 1980 suppleret med *Larix sibirica* Ledeb. var. *sukaczewii* N.V. Dylis. NV-USSR. Opr.,: Centrale Ural. Arboretet no. 1237/77. Sået 1977.

21. *Picea schrenkiana* Fisch. & Mey. var. *tianschanica* (Rupr.) Cheng & Fu. C-Asien. Opr.: Tienshan-bjergene, Sinkiang, V-Kina. Coll.: Chinese Academy of Forestry. Aboretet har i to omgange modtaget frø (Arb. no. 351/71 og 265/79). Udplantet 1983 og 1987. Der synes at være en jævn overgang fra *Picea smithiana* i vestlige Himalaya-Afghanistan til *Picea schrenkiana*.

Fig. 7. Tv. gruppe 13 med *Pinus ponderosa* og th. gruppe 14 med *Picea orientalis*. S.Ø. fot. 1. maj 90.

Fig. 8. *Pinus banksiana* i udspring i gruppe 17. S.Ø. fot. 1. maj 90.

22. *Picea engelmannii* var. *glauca*. Samme materiale som i felt no. 3.
23. *Metasequoia glyptostroboides* Hu & Cheng, (Vandgran). Hubei-provinsen, Kina. Gruppen omfatter dels stiklingeformerede planter af et af de træer i Arboretet, der spirede af det første frø samlet i Kina efter træets opdagelse i 1941 (sået 1947, enkelttræafkom), dels planter af en ny frøhøst fra flere individer i den naturlige bestand (Arboretet no. 109/79), modtaget fra the Chinese Academy of Forestry. Sået 1980, plantet 1983. I sydranden af gruppen er ca. 1985 plantet 2 *Abies procera* Rehd. (Sølvgran, Nobilis). V-Nordamerika.
24. *Pinus densiflora* Sieb & Zucc. Japan-Korea-NØ Kina. Modtaget fra Kina (The Chinese Academy of Forestry) som *Pinus thunbergii*. Arboretet no. 116/80. Gruppen udviser stor individuel variation og omfatter dels ren *P. densiflora*, dels formodede hybrider med *P. tabulaeformis*.
25. *Abies koreana* Wils., (Koreansk Ædelgran). Sydkorea. Opr.: Halla-

san, Cheju-do, 33°22'S, 126°32'E, 1500 m, Sydkorea. Arboretet no. 359/77. Coll.: Nordisk Arboretudvalgs Korea-ekspedition 1976. Sået 1977, plantet 1983. Enkelttræafkom.

26. *Abies homolepis* Sieb. & Zucc., (Skruegran, Nikko-Ædelgran). Japan. Fra D.T. Poulsens Planteskole, plantet 1975.

27. *Pinus densata* Mast. C-Kina. Opr.: Tasueh Shan, 31°N, 102°E, 2370 m, Sichuan. Arboretet no. 131/80. Coll.: The Chinese Academy of Forestry. Sået 1980, plantet 1984. Af en oprindeligt større gruppe var der i 1990 kun en enkelt plante tilbage. Arten er yderst sjælden i kultur.

28. *Abies concolor* (Gard.) Engelm., (Langnålet Ædelgran). SV Nordamerika. Fra D.T. Poulsens Planteskole, plantet 1975.

29. *Abies koreana* Wils., (Koreansk Ædelgran), Sydkorea. Opr.: Hallasan, Cheju-do, 33°23'N, 126°34'E, 1700 m, Sydkorea. Arboretet no. 346/77. Coll.: Nordisk Arboretudvalgs Korea-ekspedition. Sået 1977, plantet 1980, Enkelttræafkom.

30. *Pinus jeffreyi* Murr., (Jeffrey-Fyr). SV-USA. Fra D.T. Poulsens Planteskole, plantet 1975.

31. *Larix decidua* Mill., (Europæisk Lærk). C-Europa. Fra D.T. Poulsens Planteskole, plantet 1975. Gruppen senere suppleret med et enkelt eksemplar fra Arboretet.

32. *Thuja plicata* D.Don, (Kæmpe-Thuja). NV-Nordamerika. Fra Arboretet (»Schäffer Øst«), plantet 1975.

33. *Calocedrus decurrens* Florin, (Flodceder). SV-USA. Fra D.T. Poulsens Planteskole, plantet 1975. Suppleret med 3 *Abies lasiocarpa* Nutt., (Klippegran). V-Nordamerika. Opr.: Highland Lookout, Montana, USA. Arboretet no. 223/78. Coll.: IUFRO. Sået 1978, plantet 1983. *Abies lasiocarpa* er en særdeles hårdfør ædelgran-art, der danner skovgrænse mange steder i de nordlige Rocky Mountains, Cascades Mountains og Coast Range. I sit hjemland er den oftest ekstremt smalkronet.

34. *Thuja standishii* Carr., (Japansk Thuja). Japan. Planter fra Arboretet produceret af Bent Søegaard 1968 som kontrolleret krydsning mellem to træer i Forstbotanisk Have i Charlottenlund (B.25×B.29).

35. *Larix gmelinii* (Rupr.) Litvin. NØ-Asien. Opr.: Provinsen Kabarovsk, USSR. Modtaget fra Botanisk Have i Vladivostok under navnet *Larix maritima* Sucakz., som måske snarere bør opfattes som et varietetsnavn. Arboretet no. 408/84. Sået 1984, plantet 1987. Frostfølsom i milde vintre på grund af for tidligt udspring.

36. *Juniperus virginiana* L., (Blyants-Ene). Ø-Nordamerika. Opr.: Amherst, USA. Arboretet no. 227/68. Coll.: S. Ødum 1967. Sået 1968, plantet 1975. Materialet er fra en naturlig bestand fra nær artens nordgrænse.

37. *Juniperus chinensis* L., 'Blaauw'. Klon af Kinesisk Ene. Fra D.T. Poulsens Planteskole, plantet 1975.

38. *Cedrus libani* Loud., (Libanonceder). Lilleasien. Opr.: Kumluca, 36°37'N, 30°23'E, 1350 m, Antalya, Tyrkiet. Arboretet no. 350/85. Coll.: Det tyrkiske statsskovvæsen. Frøparti indkøbt og distribueret af Frosts Skovfrøhandel, sået 1985, plantet 1989 og 1990. Denne tyrkiske proveniens af Libanonceder er nok den mest hårdføre ceder. Tor Nitzelius (1968), Göteborg Botaniska Trädgård, var den første, der indførte tyrkiske provenienser af Libanonceder til Norden, og med et overbevisende godt resultat. Arboretet har mange fine træer af to tyrkiske provenienser, modtaget fra Göteborg 1959 og 1964. Gruppen bestod oprindelig af *Pinus wallichiana* Jacks., (Tårefyr), Himalaya. Planter fra S. Th. Sørensens Planteskole 1978. To træer tilbage 1990.

39. *Picea breweriana* S. Wats., (Brewers Gran). Siskiyou Mountains omkring grænsen mellem Californien og Oregon. Indført til Europa 1891. Træerne i gruppen er podninger (en enkelt klon) fra D.T. Poulsens Planteskole, plantet 1975.

40. *Pinus koraiensis* Sieb. & Zucc. (Koreansk fyr), NØ-Asien. Opr.: Heilungkiang provinsen, N-Kina. Arboretet no. 397/76. Coll.: The Chinese Academy of Forestry. Gave fra den kinesiske forstdelegation, der i 1976 besøgte Danmark. *Abies koreana* Wils., (Koreansk Ædelgran). Sydkorea. Opr.: Halla-san, Cheju-do, 33°22'N, 126°30'E, 1800 m. Arboretet no. 363/77. Enkelttræ-afkom. Sået 1977, plantet 1983. Coll.: Nordisk Arboretudvalgs Koreaekspedition 1976.

41. *Picea meyeri* Rehd. & Wils. C-Kina. Opr.: Shosien, 39°N, 112'E, 2000 m, Shensi. Arboretet no. 107/80. Coll.: The Chinese Academy of Forestry. Sået 1980, plantet 1986. Denne hårdføre kinesiske gran er sjældent dyrket. Dette er vist den første indførsel af arten i Danmark.

42. *Pinus washoensis* Mason & Stockwell. SV-USA. Opr.: Warner Mts. 41°12'N, 120°8'W, 2410 m. Californien. Arboretet no. 47/86. Coll.: Inst. of Forest Genetics, Berkeley. Sået 1986, plantet 1990. Af frø fra to enkelttræer. Denne sjældne fyr, hørende til *ponderosae*-sektionen, blev opdaget 1938 på Mt. Rose, Nevada, derefter på et par nærliggende lokaliteter, og beskrevet i 1945 (Critchfield 1984). Dette materiale er første indførsel i Norden.

43. *Picea koyamai* Shiras (Koreansk Gran). Korea-Japan. Opr.: Kwangneung, Sydkorea. Arboretet no. 465/82. coll.: Kwanak Arboretum. Sået 1982, plantet 1987. Denne art af gran ses meget sjældent i kultur. Den vokser i Japan kun på Mt. Yatsuga på det centrale Honshu, hvor den blev fundet og beskrevet fra i 1911. I det nordlige Korea og tilgrænsende Kina og USSR er udbredelsen større, og materialet her burde måske opfattes som en nærtstående art, *Picea koraiensis* Nakai.

44. *Pinus strobiformis* Engelm. Mexico, Arizona, New Mexico. Opr.: Coconino, 30°30'N, 111°30'W, Arizona, USA. Arboretet no. 505/81. Coll.:

US Forest Service. Sået 1981, plantet 1985. Af denne 5-nålede meget sydlige art af Fyr med store, bananformede kogler, har denne proveniens ejendommeligt nok vist sig fuldt hårdfør indtil nu. Den står nær *Pinus ayacahuite* Ehrenb., som er udbredt i bjergene i centrale og sydlige Mexico. Den er imidlertid ikke resistent mod blærerust og risikerer derfor at gå til i tilfælde af angreb.

45. *Pinus hwangshanensis* Hsia. C-Kina. Opr.: Tapiehshan, 30°N, 116°E, 1160 m, Hubei, Kina. Arboretet no. 99/80. Coll.: The Chinese Academy of Forestry 1979. Sået 1980, plantet i 1984. Denne Fyr har indtil denne formidling af frø fra Kina vist ikke været dyrket i Europa. Den har muligvis oprindeligt udskilt sig i en hybridzone mellem *Pinus yunnanensis* (som ikke er hårdfør i Danmark) og *P. tabulaeformis*.

46. *Larix sibirica* Ledeb., (Sibirisk Lærk). USSR. Af frø høstet i plantet bestand i Estland. Arboretet no. 278/79. Sået 1980, plantet 1983. I milde vintre springer Sibirisk Lærk for tidligt ud og skades i det tidlige forår af nattefrost og udtørring af nålene.

47. *Abies lasiocarpa* Nutt., (Klippegran). V-Nordamerika. Opr.: Laramie Mts., 42°29'N, 105°50'W, 2400 m, Wyoming, USA. Arboretet no. 375/71. Coll.: L. Feilberg & S. Ødum 1971. Sået 1978, plantet 1986. Se også felt 33.

48. *Chamaecyparis lawsoniana* Parl., (Lawsoncypres). Siskiyou Mts. omkring grænsen mellem Californien og Oregon. Fra D.T. Poulsens Planteskole 1975.

49. *Abies balsamea* Mill., (Balsamgran). NØ-Nordamerika. Fra S. Th. Sørensens Planteskole, plantet 1975.

50. *Picea mariana* (Mill.) B.S.P., (Sortgran). N-Nordamerika. Opr.: Badger, 48°48'N, 56°07'W, 250 m, New Foundland, Canada. Arboretet no. 218/68. Coll.: H. Mandø 1966. Sået 1978, plantet 1980. Sortgran er i sit hjemland den dominerende træart i sumpskov over permafrossen jord i taigaen fra Newfoundland til Alaska.

51. *Tsuga heterophylla* Sarg., (Vestamerikansk Tsuga), NV-Nordamerika. Opr.: Der indgår to Alaska-provenienser i gruppen, begge fra kystskove i »The Panhandle« mod sydøst: Hollis, Arboretet no. S.6002, og Mendenhall Valley, Juneau, Arboretet no. 64/82. Det første parti: coll. Al Harris 1966, sået 1968, plantet 1975. Det andet: coll. (opgravede småplanter) Trondur Leivsson 1981, plantet 1988. Tsuga forynger sig i naturen overvejende på humusrig, fugtig jord i læ og skygge og har derfor svært ved at komme i gang på en vindeksponeret, solbeskinnet og græsbevokset plads som her. Alaska-herkomster er nordligere end det i Danmark normalt dyrkede materiale af arten.

52. *Picea smithiana* Boiss., (Himalaya-Gran). Vestlige Himalaya-Afghanistan. Opr.: Minapin Glacier, 3050 m, Gilgit, Pakistan. Arboretet no.

87/84. Coll.: Björn Aldén, Göteborg Bot. Trädgård. Pakistan Ekspedition 1983. Sået 1984, plantet 1990. I Arboretet har en indsamling af arten fra Paktia-provinsen i Afghanistan vist sig helt hårdfør i de strenge vintre i den seneste snes år, og dette materiale fra nærliggende bjerge i Pakistan tegner tilsvarende godt. Østligere herkomster har ikke overlevet strenge vintre.

53. *Pinus heldreichii* Christ. SØ-Europa. Fra S. Th. Sørensens Planteskole, plantet 1975. På et noget usikkert grundlag udskilles var. *leucodermis* (Ant.) Markgraf, og planterne i denne gruppe er solgt som sådan.

54. *Sequoiadendron giganteum* (Lindl.) Buchholz, (Kæmpetræ). Californien. Opr.: Landslide grove, 2100 m, California. Coll.: Bob Graton. Arboretet no. 14/91. Sået 1991, plantet 1992.

55. *Abies homolepis* Sieb. & Zucc., (Skruegran, Nikko-Ædelgran). Japan. Opr.: Odaigahara, 1600 m, Honshu, Japan. Arboretet no. 859/77. Coll.: Nordisk Arboretudvalgs Japan-ekspedition 1976. Sået 1977, plantet 1983. Der er oprindelig kun plantet dette træ.

Fejlslagne plantninger 1975-87

Nogle af de nuværende grupper har erstattet tidligere, mere eller mindre mislykkede plantninger. Årsagerne skønnes at have været lave temperaturer, under −20° (t), senvintersvidninger, altså kombination af frost og udtørring af sol og vind (s), eller etableringsproblemer i den ret stive jord og græsvegetation (e); der kan være samspil mellem flere negative faktorer. Nogle tilbageblevne individer vil enten blive besvaret sammen med de nuværende hovedarter i grupperne, eller blive hugget eller flyttet: *Sciadopitys verticillata* (23, s), *Pinus wallichiana* (38, t, s), *Cedrus deodara* (17, t), *Araucaria araucana* (43, t), *Tsuga mertensiana* (52, e), *Larix potaninii* (35, t, e), *Sequoiadendron og giganteum* (25, t, s).

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VIGNETKOMMENTAR

Under et ophold i Frankfurt d. 18. marts 1991 observerede foreningens formand, Søren Ødum, hanblomstring i *Metasequoia glyptostroboides* Hu & Cheng.

Dette gav anledning til, at man også herhjemme i marts måned eftersøgte og for første gang siden *Metasequoias* indførsel i Danmark 1947 fandt hanblomstrende eksemplarer både i Arboretet, Hørsholm, i Forsthaven, Charlottenlund og i Botanisk Have, København, hvorfra Lars Feilberg har fået materiale til tegning af årets forsidevignet.

På forespørgsel har den botaniske have i München oplyst, at hanblomstring i *Metasequoia* første gang blev iagttaget i 1989, medens dr. Allan Mitchell meddeler, at han endnu ikke har observeret fænomenet, hverken i områder med relativt kølige somre som i Bodnant, North Wales eller i Cambridge, Kew og Alice Holt, som har Englands højeste sommertemperaturer.

Hanblomsterne hos Metasequoia har ca. 20 støvblade, er 4-5 mm lange og sidder i en klaseagtig, 10-30 cm lang, side- eller endestillet blomsterstand. Hanblomstringen i Danmark synes at være sparsom med ret korte blomsterstande og dermed færre blomster end tilfældet er i områder med højere sommertemperaturer, hvor de mange, op til 30 cm lange orange – brune blomsterstande er særdeles iøjnefaldende.

I 1991 konstateredes tillige en kraftig koglesætning, og mulighederne for bestøvning har således været tilstede. En undersøgelse af frø fra Forsthaven i Charlottenlund foretaget af Poul Søndergaard viste imidlertid, at en befrugtning i intet tilfælde havde fundet sted. Man må derfor formode, at pollenudviklingen er blevet skadet af frost i hanblomstringsperioden.

Medens hanblomstring altså for første gang i Danmark er konstateret i 1991, observeredes koglesætning hos *Metasequoia* allerede i 1968. Begivenheden blev markeret ved, at Johannes Hedegaard tegnede en forsidevignet af koglerne til foreningens årsskrift 1970 og samtidig illustrerede Johan Langes artikel: »*Metasequoia glyptostroboides* har båret kogler i Danmark«.

Helge Vedel

BERETNING FOR 1991

Der blev i 1991 afholdt 6 møder og 3 ekskursioner.

Den 28. januar holdt Søren Ødum foredrag om Taiwan's plantegeografi. – Generalforsamlingen den 18. marts genvalgte Jette Dahl Møller, Poul Søndergaard og Ulla Wicksell til bestyrelsen, ligesom nationalbankdirektør, dr. polit. Erik Hoffmeyer genvalgtes til posten som formand for repræsentantskabet for Fonden for Træer og Miljø. I tilslutning til mødet viste Find Günther Christensen lysbilleder fra foreningens sommer-ekskursion i Tyrkiet 1990.

Den 8. april holdt forstfuldmægtig Inken Petersen og cand.silv., stud. lic. Allan Breum Larsen foredrag om skov og skovbrug i Sydøstasien.

Den 6. juni var foreningens medlemmer indbudt til »åben aften« med rundvisninger i Arboretet. – En ekskursion i Fredensborg Park den 29. juni blev ledet af slotsgartner Jakob Jakobsen, og ekskursionen fortsatte til H.P. Danielsens Planteskole, hvor Danielsen selv foreviste planteskole og privathave.

Foreningens store sommer-ekskursion i dagene 17.-18. august gik til Vallø Slotspark, pinetet på Køge Ås, Ole Bønsdorffs Planteskole, Hedeland og Ledreborg Slotspark med Find Günther Christensen, stiftsforvalter Fl. Skyum, skovrider Søren Boas, skovfoged H. Hjerrild, direktør Fl. Johansen, Ole Bønsdorff, landskabsarkitekt Jørg. Vesterholt og lensgreve K.J.L. Holstein-Ledreborg som vejledere.

Den 29. oktober var foreningens medlemmer indbudt til en af Arboretet arrangeret gæsteforelæsning, hvor direktør Heiki Tamm, overgartner Jüri Elliku, dendrolog Peter Viikholm og økolog Rihu Raudi fra Tallinn Botaniske Have, Estland, gennemgik botaniske og dendrologiske aktiviteter i Estland, herunder introduktioner fra Sachalin og Kurilerne.

Den 11. november berettede intendent Björn Aldén, Göteborg Botaniska Trädgård og lektor Poul Søndergaard, Arboretet, om en frøindsamlingsrejse i Marokko. – Den 10. december causerede havebrugskonsulent Grethe Vembye med lysbilleder over emnet »prægtige træer på min vej«.

Foreningen er en varm tak skyldig til foredragsholdere, ekskursionsledere og -værter for en værdifuld indsats.

Laboratoriebetjent Kaj Svendsen, som i knapt 40 år har været foreningen behjælpelig med arkiv, forsendelser og meget andet, ophørte med disse aktiviteter ved sin pensionering i august.

Den 20. december døde handelsgartner Søren Melkær, som har været aktiv i foreningen lige siden dens start i 1949, og stadsgartner Børge Kahr Nielsen, som også i en lang årrække bidrog til foreningens møder og ekskursioner, døde tidligere på året.

Foreningen havde ved årsskiftet 363 medlemmer.

Søren Ødum