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Lassdal, an old ballast site in eastern Nyland, S Finland

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The ballast site of Lassdal was known for its exotic plants brought with soil from abroad by sailing ships. The ballast site was more or less abandoned already at the beginning of the 20th century, at the latest. However, several ballast plants grew in Lassdal in 1946. A few of them were still growing there in 2015. The vascular plant flora comprised 17 taxa of trees and shrubs and 59 field layer taxa in 2009-2015. The following are dealt with more in detail: *Allium oleraceum, Arabis glabra, Campanula rapunculoides, Carex hirta*, cf. *Draba incana, Hercaleum sphondylium, Medicago lupulina* var. *willdenowiana, Melilotus albus, Stachys sylvatica* and *Viola odorata*. Of these, *Campanula rapunculoides, Stachys sylvatica* and *Viola odorata* have not been observed earlier in Lassdal.

Introduction

During the era of sailing ships, especially during the 19th and the beginning of the 20th centuries, ballast was used when sailing without cargo. The ballast often comprised soil taken on board in a foreign harbour and it was then unloaded either in places where new cargo was loaded or in the home harbour, e.g. during winter.

The ballast contained different diaspores of vascular plants and thus ballast sites were known already during the 19th century for their exotic flora (Alcenius 1895). Renown ballast sites in Finland were, e.g. Käringsund, Frebbenby and Mariehamn in the Åland Islands (Hæggström & Hæggström 2010), Räfsö / Reposaari in Björneborg / Pori (Kalinainen 1987, Jutila 2000, Suominen 2013), the harbour with ballast heaps and a timber yard in Lappvik on the Hangö peninsula (Häyrén 1909, Hidén 1924, Luther 1940), the ballast islands Yttre Barlastholmen and Lilla Barlastholmen at Kråkö near Borgå / Porvoo, and Lassdal (Lemberg 1947) in the former municipality of Pernå / Pernaja, today included in the town of Lovisa / Loviisa.

As no new ballast soil was brought to the old ballast sites for many decades or even more than a century, the exotic ballast flora has declined or disappeared and many of the sites have been overgrown with shrubs and even wood.

During three visits to the ballast site at Lassdal on August 28, 2009, April 29, 2014 and September 10, 2015, we noticed that a few of the ballast plants still remain in the site.

Lassdal ballast site

The ballast site of Lassdal is located on a promontory on the southwestern seashore of the narrow bay Pernåviken, just south of the estate of Sjögård. The centre of the former municipality

of Pernå / Pernaja is located about 2 km to the north on the opposite seashore. The coordinates of the central part of the site are with 100 m accuracy, according to the Uniform Coordinate System (UCS) Grid 27 °E, 67014:34471.

The following description of the ballast site of Lassdal is chiefly according to Lemberg (1947), who visited the place in 1946. The ballast site was founded at the beginning of the 19th century. Sailing ships unloaded their ballast at this place and loaded wooden products which were transported by barges from the sawmill at Forsby about 9 km to the north. The remnants of two loading bridges were still seen in 1946.

Ballast was unloaded in Lassdal until steam ships replaced the sailing ships. According to Lemberg (1947), the ballast site was abandoned at the end of the 19th century. However, as the site was not totally overgrown with trees and shrubs in 1946, we think that sailing ships with ballast were still used during the first decades of the 20th century. As steam ships took over, no more ballast was brought to the site and its vegetation could then develop more or less without disturbance. Lassdal was, however, occasionally used for storage of timber and during some summers it was grazed by cattle during the first decades of the 20th century. An about 400 m^2 large wooden terrace was built in the northern part of the site in 1938. It was used for storage of coal for transport vessels in 1938 and 1939. The terrace was deteriorating in 1946, harbouring a luxuriant vegetation of both domestic and exotic plants.

During the ballast era nearly 20 000 m^3 ballast was deposited at the Lassdal site. The ballast site is elliptical; the length of the axes are about 60 m and 120 m and the area about 0.7 hectare. The ballast was unloaded on a gentle NE slope on the promontory with the hill Tornberget (about 22.5 m a. s. l.) W of the site. The ballast site be-

Fig. 1. The embankment of the ballast site in Lassdal seen from the seashore. This part of the embankment was trampled by deer in 2015. A fallen spruce stem lies over the moss covered edge of the embankment. The tree in the front is a black alder (*Alnus glutinosa*). Photo April 29, 2014, C.-A. Hæggström.

gins with a steep 2.0–2.5 m high embankment above the stony and sandy seashore (Fig. 1). The seashore is scattered with fragments of foreign rocks, among others sandstone, slate, flint, limestone and chalk, and further pieces of brick, mortar, china/porcelain, potsherd, clay pipes, cinder, etc. (Fig. 2). Shells of mussels and oysters and a dry sea horse are among the exotic animals found. Formerly, pieces of amber and coral were found, too. The ballast soil is obviously rich in calcium (Fig. 3) and generally more fertile than the surrounding natural soils.

The ballast site is a fairly even plateau consisting of ballast soil only. The plateau is undulating at the edge towards the inland natural soil – one can clearly see where loads of ballast was deposited. A large metal ring bolted to an erratic in the wood at the N margin shows were ships were moored during unloading and loading.

Lemberg (1947) suggests that the first visit by botanists could have been in 1885, at the earliest. *Reseda lutea* was collected in a ballast site in Pernå by E. Estlander on July 29, 1885 (voucher preserved in VOA; for herbarium acronyms, see Index Herbariorum 2015) (cf. Lampinen et al. 2015a). The oldest written evidence about a plant in the ballast site of Lassdal is probably the short note regarding *Genista tinctoria* (de la Chapelle 1891). He collected it on July 16, 1889 (voucher specimen preserved in H). He wrote on the label that he had seen the same plant in Lassdal every year since July 20, 1885.

According to Lemberg (1947) and Lemberg & Klingstedt (1967), three other species were collected in Lassdal by A. H. de la Chapelle in 1887. These were *Cerastium arvense* (voucher specimen in H, cf. Lampinen et al. 2015b), *Mercurialis annua* (voucher specimens in H, OULU and TURA) and *Senecio viscosus* (voucher specimen

Fig. 2. Ballast soil on the seashore. Pieces of flint, limestone, foreign rock, potsherd and a brick are mixed with domestic stones and pieces of gravel. Photo April 29, 2014, H. Åström.

Fig. 3. A heap of soil on the roots of a fallen spruce. The soil is whitish due to chalk and there are abundant limestone pieces, too. A few specimens of flowering *Melilotus albus* grew on the soil heap in 2015. Photo April 29, 2014, C.-A. Hæggström.

in H, cf. Lampinen et al. 2015c). Ballast is mentioned on the labels, but Lassdal is not mentioned at all. Thus, we cannot be sure that these plants was collected in Lassdal, as there were at least one other ballast site in Pernå.

Lemberg (1947) and Lemberg & Klingstedt (1967) mention also *Papaver argemone, P. dubium* and *Trifolium aureum* (as *T. agrarium*) as species observed in Lassdal during the late 19th century.

Lemberg (1947) observed 11 taxa of shrubs and trees and 98 taxa in the field layer in 1946. According to him, the vegetation was then a meadow with a dense sward. The adjoining area at the western border was a spruce wood. Young spruces and some other trees, *Pinus sylvestris, Betula pendula, Populus tremula* and *Sorbus aucuparia*, grew at the ballast close to the spruce wood. Small trees and shrubs grew also in other parts of the ballast site.

Lassdal today

Lassdal is overgrown with trees and shrubs today, with 17 taxa observed in 2009–2015 (Table 1). The mixed stands with predominant *Picea abies* are partly dense, especially in the central part of the ballast site, with a very lax or absent field layer (Fig.4). There is a gap near the NE border where a few tall spruces have fallen (Fig. 5). Many 20–30-cm-high spruces grew in the gap on the mossy ground in 2015. There are a also few other small gaps with only a few shading trees, e.g. at the SW border.

Of the tree species, *Salix caprea* represent an early invader on open abandoned ground; a large tree grows near the seashore (Fig. 6). There were already 8–10-m-high *S. caprea* trees growing in Lassdal in 1946 (Lemberg 1947). The *Betula* species and *Populus tremula* belong also to the early tree species on open ground. A large *Sorbus au-*

Fig. 4. A dense mixed wood with predominant *Picea abies* and a few *Betula pendula, Populus tremula* and *Salix caprea* grows in the central part of the ballast site. The field layer is very lax or even absent. Photo September 10, 2015, C.-A. Hæggström.

Fig. 5. The gap near the NE border with fallen spruces. An older decaying tree trunk lies in the foreground. The soil heap with *Melilotus albus* is located to the left in the background. Small spruces grow to the right. A dense moss carpet, mainly *Rhytidiadelphus triquetrus*, covers the soil. Photo September 10, 2015, H. Åström.

Fig. 6. An about 20-m-high *Salix caprea* grew near the seashore. The girth of the trunk at 1.3 m height was 270 cm. The author CAH stands by the tree. Photo September 10, 2015, H. Åström.

cuparia grew near the SW border (Fig. 7). The tree is a pollard as it has a bunch of top branches starting from the same point on the short stout trunk. The rose shrubs, *Rosa caesia* and *R. dumalis*, and *Sambucus racemosa* are also typical of open ground. The sole small oak seen in 2015 may have difficulties to thrive in the dense spruce stand.

The field layer is partly dense, partly lax or even lacking. In some spots, e.g. the gap near the NE border, the ground is covered with moss carpets, among others *Hylocomium splendens* and *Rhytidiadelphus triquetrus*. A part of the embankment was heavily trampled by deer in 2015. A few of the rare plants occurred on the trampled embankment.

The field layer comprised 59 taxa in 2009–2015 (Table 1). Several of them are typical of open areas such as meadows, lawns and open ruderal ground, e.g. *Achillea millefolium, Epilobium angustifolium, Geum urbanum, Glechoma hederacea, Lathyrus pratensis, Leucanthemum vulgare, Pimpinella saxifraga, Ranunculus acris*, *R. polyanthemos*, *R. repens, Rumex acetosa, Stellaria graminea, Tanacetum vulgare, Taraxacum* spp., *Veronica chamaedrys, Vicia cracca*, *V. sepium* subsp. *montana* and subsp. *sepium* and the grasses *Agrostis capillaris, Dactylis glomerata, Elymus repens, Festuca rubra*, *Poa angustifolia* and *P. palustris*. Of the mentioned species, *Glechoma hederacea* formed large stands at the W border below a quite dense spruce canopy. A few weedy plants, *Aegopodium podagraria, Artemisia vulgaris* var. *vulgaris* and *Lamium album*, were also found.

Due to the dense tree vegetation, some spruce woods species occur, namely the pteridophytes *Dryopteris carthusiana*, *D. filix-mas* and *Gymnocarpium dryopteris*, the dwarf shrub *Vaccinium myrtillus*, the herbs *Maianthemum bifolium, Mycelis muralis, Oxalis acetosella, Solidago virgaurea* and *Trientalis europaea*, and the graminids *Carex digitata* and *Luzula pilosa*.

A few of the plants found are more or less of ballast origin. The following are worth mentioning:

Allium oleraceum – Five specimens of *Allium oleraceum* grew on the embankment slope in 2009. Two of the plants had a few flowers. Their habitus was of the tetraploid cytotype with small and green bulbils (Åström et al. 2015), although we were not able to confirm the chromosome number microscopically. We could not find this species again in 2014 and 2015. We found it in a new locality at the N margin of the cultivated field Lassdalsåkern about 350 m SW of Lassdal. *A. oleraceum* is not a typical ballast plant, but it was collected in Lassdal by Ernst Häyrén in 1946 (H). According to Lemberg (1947), *A. oleraceum* grew at the wooden terrace; he mentions one single plant. Its abundance was indicated as *pcc* (very sparse) in Lemberg & Klingstedt (1967). It has been collected in a few places elsewhere in the former municipality of Pernå (Lampinen et al. 2015d).

Table 1. The tree and shrub taxa and the field layer taxa observed in the ballast site of Lassdal in 2009, 2014 and 2015. The nomenclature is according to the Field Flora of Finland (Hämet-Ahti et al. 1998, 2005).

Trees and shrubs

Acer platanoides, 2015, a small specimen.
Alnus glutinosa, 2009, 2014, 2015, at the seashore. – Also noted by Lemberg (1947).
Betula pendula, 2014. – Also noted by Lemberg (1947).
B. pubescens, 2015, a few large trees in the southern part.
B. sp., 2009.
Picea abies, 2009, 2014, 2015, dense stands, abundantly young trees. – Also noted by Lemberg (1947).
Populus tremula, 2014, 2015, large high grown trees. – Also noted by Lemberg (1947).
Prunus padus, 2009, 2015, small specimens, also larger trees. – Also noted by Lemberg (1947).
Quercus robur, 2015, small specimens.
Ribes alpinum, 2014, 2015.
R. rubrum coll., 2015, one shrub at the W border.
Rosa caesia, 2015.
R. dumalis, 2009, 2015. – Also noted by Lemberg (1947).
Salix caprea, 2009, 2014, 2015, several trees, some of them dead; one about 20 m tall single stemmed tree, the girth at 1.3 m was 270 cm in 2015. The tree has a thick branch at about one metre above ground, and it has several crown branches at about 2.5 m. – Also noted by Lemberg (1947).
S. sp., 2014, one small specimen.
Sambucus racemosa, 2014, 2015, one small shrub.
Sorbus aucuparia, 2009, 2014; 2015 one large pollard near the SE border and a few small trees. – Also noted by Lemberg (1947).

Field layer species

Achillea millefolium, 2009, 2015 – Also noted by Lemberg (1947).
Aegopodium podagraria, 2015, abundant at the W border. – Also noted by Lemberg (1947).
Agrostis capillaris, 2015, a dense stand in the S part near the large *Salix caprea*. – Also noted by Lemberg (1947).
Allium oleraceum, 2009, 5 specimens observed. – Also noted by Lemberg (1947).
Angelica archangelica subsp. *litoralis*, 2015, at the seashore. – Also noted by Lemberg (1947).
A. sylvestris, 2014, 2015. – Also noted by Lemberg (1947).
Anthriscus sylvestris, 2014, 2015. – Also noted by Lemberg (1947).
Arabis glabra, 2015, two specimens on the trampled embankment. – Also noted by Lemberg (1947).
Artemisia vulgaris var. *vulgaris*, 2014; 2015, a few specimens at the roots of a fallen tree and a soil heap at the NE border. – Also noted by Lemberg (1947).
Campanula rapunculoides, 2009, abundant vegetative shoots at the N border; 2015, tens of small shoots at the E part, e.g. on the trampled embankment.
Carex digitata, 2014, 2015.
C. hirta, 2009, 27 specimens; 2015, 12 specimens at the trampled embankment. – Also noted by Lemberg (1947).
cf. *Draba incana*, 2015, a small leaf rosette on the trampled embankment.
Dactylis glomerata, 2014, 2015. – Also noted by Lemberg (1947).
Dryopteris carthusiana, 2014, 2015.
D. filix-mas, 2015.
Elymus repens, 2009. – Also noted by Lemberg (1947).
Epilobium angustifolium, 2009; 2015, a few small shoots in the NE part. – Also noted by Lemberg (1947).
Equisetum arvense, 2009. – Also noted by Lemberg (1947).
Festuca rubra, 2009, 2014. – Also noted by Lemberg (1947).
Galium cf. *album*, 2014. – Also noted by Lemberg (1947).
G. uliginosum, 2015, one small specimen at the trampled embankment.
Geum urbanum, 2015. – Also noted by Lemberg (1947).
Glechoma hederacea, 2015, abundant at the W border. – Also noted by Lemberg (1947).
Gymnocarpium dryopteris, 2015.
Heracleum sphondylium, 2009; 2015 about ten leaves near the E border, one specimen flowered in 2015. – Also noted by Lemberg (1947).
Lamium album, 2009. – Also noted by Lemberg (1947).
Lathyrus pratensis, 2009, 2015. – Also noted by Lemberg (1947).
Leucanthemum vulgare, 2014; 2015, one spot with flowering specimens near the NE border. – Also noted by Lemberg (1947).
Luzula pilosa, 2009, 2014, 2015. – Also noted by Lemberg (1947).
Lysimachia vulgaris, 2015, on the seashore.
Maianthemum bifolium, 2015, at the W border.
Medicago lupulina var. *willdenowiana*, 2015, on the trampled embankment. – Also noted without assignment to a specific variety by Lemberg (1947).
Melilotus albus, 2015, a few specimen on the soil heap at the NE border and a few specimens on the trampled embankment. – Also noted by Lemberg (1947).
Mycelis muralis, 2015.
Oxalis acetosella, 2014, 2015.
Phalaris arundinacea, 2015, on the seashore.
Pimpinella saxifraga, 2009, 2015, on the trampled embankment. – Also noted by Lemberg (1947).
Poa angustifolia, 2009. – Lemberg (1947) observed *P. pratensis* coll.
P. palustris, 2009.
Ranunculus acris, 2014, 2015 – Also noted by Lemberg (1947).

R. polyanthemos, 2015, one specimen on the seashore below the trampled embankment. – Also noted by Lemberg (1947).
R. repens, 2015, a dense stand at the W border. – Also noted by Lemberg (1947).
Rubus idaeus, 2009, 2015. – Also noted by Lemberg (1947).
Rumex acetosa, 2015. – Also noted by Lemberg (1947).
Solidago virgaurea, 2015, at the W border.
Stachys sylvatica, 2015, in the SW part.
Stellaria graminea, 2014. – Also noted by Lemberg (1947).
Tanacetum vulgare, 2009, 2015. – Also noted by Lemberg (1947).
Taraxacum spp., 2014, 2015. – Also noted by Lemberg (1947) as *Taraxacum* (coll.).
Trientalis europaea, 2015, at the W border.
Tussilago farfara, 2015, on the seashore. – Also noted by Lemberg (1947).
Urtica dioica, 2014; 2015 on the soil heap in the NE part. – Also noted by Lemberg (1947).
Vaccinium myrtillus, 2014, 2015.
Veronica chamaedrys, 2009, 2014, 2015. – Also noted by Lemberg (1947).
Vicia cracca, 2015. – Also noted by Lemberg (1947).
V. sepium subsp. *montana*, 2009, 2015. – Also noted by Lemberg (1947), without assignment to any subspecies.
V. sepium subsp. *sepium*, 2015.
Viola odorata, 2015, very abundant on a 10 m × 20 m large area in the SW part.

Arabis glabra – Two specimens of *Arabis glabra* grew on the trampled embankment. It was observed by Lemberg (1947). This is a quite common species in dry and rock meadows of southern Finland. The shady locality in Lassdal is not typical of this species.

Campanula rapunculoides – Small basal leaves of *Campanula rapunculoides* grew abundantly near the N border and in the E part in 2009, but only a few dozen small plants were seen in the E part only, e.g. on the trampled embankment, in 2015. None were seen further north, because of the dense moss carpet which covered the ground. Not a single flowering plant was observed; all plants consisted of small basal leaves only. This species has not been observed earlier in Lassdal. It is not mentioned from Lassdal by Lemberg (1947). However, it has been found as a weed and ruderal plant in a few localities in the former municipality of Pernå (Lemberg & Klingstedt 1967,

▼ Fig. 7. A large *Sorbus aucuparia* pollard grows in a spruce free area at the SW border with a dense field layer comprising chiefly of *Viola odorata*. A stand of young spruces is seen to the right. Photo September 10, 2015, C.-A. Hæggström.

Lampinen et al. 2015e). Luther (1940) mentions *C. rapunculoides* from Lappvik where it was in some places abundant but usually occurred as vegetative shoots only.

Carex hirta – According to Lemberg (1947) and Lemberg & Klingstedt (1967), *C. hirta* was very abundant in Lassdal in 1946. It was collected five times in Lassdal between 1921 and 1986 (H) (cf. Lampinen et al. 2015f). *C. hirta* has prevailed and we found 27 non-flowering tufts in 2009 and still 12 in 2015. It occurs in Finland chiefly in the Åland Islands, where it is fairly common in dry sandy meadows, on roadsides and ruderal sites (Hæggström & Hæggström 2010). It is chiefly found in ballast sites, harbours and other ruderal sites in the mainland of Finland (Luther 1940, Fagerström 1958, Lampinen et al 2015f).

cf. ***Draba incana*** – A small leaf rosette with typical stellate hairs of the genus *Draba* was found on the trampled embankment in 2015. We have determined it as cf. *Draba incana*. This rare plant has a twofold distribution in Finland: it occurs along the whole south coast and the west coast to Vasa as a typical skerry plant and further in the northern part of Lapland on riverside meadows, yards and turf roofs (Hämet-Ahti et al. 1998). *D. incana* was not mentioned by Lemberg (1947), but it was collected in Lassdal by Maiju Bygden in 1903 (H) (cf. Lampinen et al. 2015g). I was also found in 1866 in Södra Altarskär in the outer archipelago of Pernå (Lemberg & Klingstedt 1967).

Heracleum sphondylium – About ten leaves of *Heracleum sphondylium* grew near the E border in 2009 and 2015. One specimen flowered in 2015. The species is quite rare in Finland. It occurs mostly in ruderal sites. *H. sphondylium* is mentioned by Lemberg (1947) and it is indicated as *st pc* (rather sparse) in Lemberg & Klingstedt (1967). It was collected six times in Lassdal between 1903 and 1964 (H) (cf. Lampinen et al. 2015h). Most of the collected specimens have been assigned to *H. sphondylium* subsp. *sphondylium* (det. Lars Fröberg, 2005).

Medicago lupulina var. ***willdenowiana*** – One specimen of *Medicago lupulina* var. *willdenowiana* grew on the trampled embankment in 2015. According to Lemberg (1947) and Lemberg & Klingstedt (1967), *M. lupulina* grew in Lassdal. It was collected in Lassdal three times between 1922 and 1964 (Lampinen et al. 2015i). The taxa collected were *M. lupulina* subsp. *lupulina* var. *glanduligera* and var. *lupulina* (det. Heinz Kalheber, 2003). *M. lupulina* has been found in a few other sites in Pernå, among them the ballast site in Sarvsalö Kattsundet, located about 10 km S of Lassdal, where it was collected in 1908 (H) (Lemberg & Klingstedt 1967, Lampinen et al. 2015i). *M. lupulina* is quite common in the Åland Islands and it occurs in many places along the south coast of Finland. It grows on lawns, in pastures, gardens, roadsides and on ruderal ground.

Melilotus albus – A few, mostly weak specimens of *Melilotus albus*, some of them with flowers, grew on the soil heap at the NE border and a further few on the trampled embankment in 2015. This species is fairly common in many parts of southern Finland, occurring on roadsides, railway embankments and yards, harbours, dumping grounds and other ruderal sites (Hämet-Ahti et al. 1998). It was collected in Lassdal by Carl-William Hammar in 1932 (H) and it was also observed by Lemberg (1947) (cf. Lampinen et al. 2015j). Lemberg & Klingstedt (1967) indicated it as *pc* (sparse) in Lassdal.

Stachys sylvatica – A few non-flowering specimens of *Stachys sylvatica* (Fig. 8) grew in the SW part of the ballast site in 2015. It has not been previously reported from Lassdal. *S. sylvatica* is typical of lush and often moist deciduous or mixed woods, e.g. of the fern rich *Filices* type woods and swamps (Jalas 1980). It has occasionally been found as an adventive plant as it probably benefits from activities of man (Jalas 1980). It is fairly common in the Åland Islands and occurs in many places in southern Finland (Hämet-Ahti et al. 1998). It was found once in the vicinity of Lassdal, namely in Lovisa / Loviisa (UCS 6699:3457) by Matti Kouvo in 1996 (Lampinen et al. 2015k).

Viola odorata – A stand of *Viola odorata* (Figs. 7–8) was found in the SW part of Lassdal in 2015. No previous observation of this species is known,

Fig. 8. Five shoots of *Stachys sylvatica* and a fairly dense carpet of *Viola odorata*. Photo September 10, 2015, C.-A. Hæggström.

either from Lassdal or from Pernå and Lovisa to which Pernå belongs today (Lampinen et al. 2015l). *V. odorata* is a garden ornamental and most of the finds in Finland are either cultivated plants or garden escapes. The bulk of the finds are from manor gardens and parks, where it often grows on lawns and under cultivated shrubs forming dense stands due to formation of stolons. It thrives well in deciduous stands, because as an early flowering species it has flowered and developed fruits before the leaves of the trees are fully developed. It thrives well in Lassdal as it has almost covered an area of about 10 m × 20 m. It had flowered in the spring of 2015 as we found remnants of capsules.

Discussion

Of the 17 tree and shrub taxa observed by us, 8 were already growing in Lassdal in 1946 (Lemberg 1947). Of the 59 field layer taxa observed by us, 40 were noted by Lemberg (1947). Of those not observed by him, two grew on the seashore in 2015, namely *Lysimachia vulgaris* and *Phalaris arundinacea*. Further, 11 species found by us but not by Lemberg are typical wood plants, namely *Carex digitata, Dryopteris carthusiana, D. filix-mas, Gymnocarpium dryopteris, Maianthemum bifolium, Mycelis muralis, Oxalis acetosella, Solidago virgaurea, Stachys sylvatica, Trientalis europaea* and *Vaccinium myrtillus*. It is understandable that these species came after 1946, as the wood has developed into dense stands since 1946.

According to Lemberg (1947), ballast soil was taken from Lassdal and brought to gardens and arable fields to ameliorate the soil. Thus ballast plants were spread to new localities in Pernå, e.g. *Allium oleraceum* to the villa area of Solbacken in Pernå church village, where soil was

brought from Lassdal more than 50 years earlier (cf. Lemberg & Klingstedt 1967). Perhaps the stand of *A. oleraceum* that we found at the northern margin of Lassdalsåkern came by ballast soil to the arable field.

The ballast site of Lassdal harbours still some of the exotic ballast plants more than one hundred years since the transport of new ballast to the site had ceased and approximately seventy years after it was totally abandoned. This is astonishing compared to some other ballast sites. Those in the Åland Islands are almost devoid of the typical ballast flora, although they are quite open. In the ballast heaps at Käringsund in Storby, municipality of Eckerö, the only species that could be of ballast origin seen in later years are *Carex arenaria, Trifolium campestre* and *T. dubium* (Hæggström & Hæggström 2010). Two other species, *Scleranthus perennis* and *Vicia lathyroides* have not been seen since the late 1990s or early 2000s. The ballast heaps at Käringsund are overgrown with trees and shrubs, but the surroundings are more open meadows and rock meadows. In Frebbenby in the municipality of Hammarland almost none of the ballast species are left. The only taxa which could be assigned to ballast were *Geranium pusillum* and *Medicago lupulina* var. *lupulina* in 2009. However, both these are fairly common in the Åland Islands in different man-made habitats (Hæggström & Hæggström 2010). Three taxa of obvious ballast origin, namely *Cardaria draba*, *Cirsium arvense* var. *maritimum* and *Daucus carota* subsp. *carota*, grew in the western harbour of Mariehamn (Hæggström & Hæggström 2010). They were still left in 2015.

Lemberg (1947) gives a detailed description of the ballast site of Lassdal and its vegetation. He had visited the site already in 1913 and thus he could draw conclusions of the change in the flora and vegetation. He enumerates several species found earlier that did not occur any longer in 1946. He also writes that the vegetation is in a status of rapid change. The rare ruderal species are disappearing as tall and weedy common species are taking over and trees and shrubs are invading the former open ballast site. He predicts that the succession will lead to a closed wood, which is the case today.

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