

The Gasteromycetes of the Åland Islands, SW Finland: an annotated checklist

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Both herbarium specimens and published data on the Gasteromycetes s.l. of the Åland Islands are treated. Altogether, 37 species have been reported which is a little more than half of the total species number of Finland. Seven species, namely *Bovista nigrescens*, *B. plumbea*, *Calvatia excipuliformis*, *C. utriformis*, *Lycoperdon perlatum*, *L. pyriforme* and *Phallus impudicus* seem to be common or fairly common in the Åland Islands. Eight species, viz. *Geastrum elegans*, *G. floriforme*, *G. schmidelii*, *G. striatum*, *Langermannia gigantea*, *Lycoperdon echinatum*, *Melanogaster ambiguus* and *Tulostoma brumale* are listed as threatened in Åland.

Key words: Åland Islands, checklist, Finland, Gasteromycetes

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Introduction

The written knowledge of the Gasteromycetes of the Åland Islands has hitherto been both scattered and rather insignificant. In his papers on Basidiomycetes of Finland, P.A. Karsten (1889, 1893, 1898) enumerates 27 species, some of them dubious, or defined differently than now, of the Gasteromycetes s.l. found within the present boundaries of Finland; none of them were mentioned to occur in Åland.

Ulvinen (1976) enumerated 50 species of Gasteromycetes s.l. found in Finland. Three further species, whose status in Finland was uncertain, were also included. Since then, several more species have been found and the total number of Gasteromycetes s.l. species found in Finland is now about 70.

This paper deals with the Gasteromycetes s.l. found in the Åland Islands. In preparing the paper, I have studied all available herbarium specimens collected in Åland, except for a few *Geas-*

trum specimens in the herbarium of Dr. Stellan Sunhede which are treated in detail in his doctoral thesis (Sunhede 1989). Besides my own collections (included in H), I have obtained specimens from the following herbaria: H, OULU, TUR, TURA and UPS. No specimens were sent from GB, KUO, LD and S. Furthermore, I have tried to find published information on Gasteromycetes from Åland.

Older published data are rarely accompanied by preserved material in herbaria. Therefore, published information on certain species may contain wrong determinations regarding the species. Lacking methods for controlling such cases, I decided to report this information according to the original papers. A few of the determinations are obviously wrong and these are discussed in each case. Some of the herbarium specimens were too young to identify their species, or even their genus.

Microscopic characters were studied in most herbarium specimens, among others all those be-

longing to Lycoperdaceae. The spores and capillitial hyphae were studied both in lactophenol with or without cotton blue and Melzer's reagent. The tiny warts or spines of *Lycoperdon* and *Bovista* spores were better seen using Melzer's reagent.

The Åland Islands

The Åland Islands comprise an archipelago of more than 6 000 islands at the edge of the northern Baltic Sea. Biogeographically this archipelago belongs to the hemiboreal zone (Ahti et al. 1968). The bedrock mostly consists of acid rapakivi granite and other granites and of gneisses, too (Hausen 1964). The soil is rich in calcium because of the Ordovician limestone which originates from the bottom of the Bothnian Sea and Lumparn Bay (Brenner 1930, Hausen 1964). Due to this calcium-rich soil and the fairly favourable climate, the vegetation is in many places luxuriant and rich in species. The calcicolous element of both fungi and plants is prominent. Many species grow here at their northernmost limits in the Baltic Sea area. The influence of man upon nature has been intense, although pasturing activities have been reduced during this century. However, grazing in woods and semi-natural habitats, such as wooded meadows, wooded pastures and seashore meadows, is much more common in Åland than in other parts of Finland.

The investigation of the Alandian Gasteromycete flora

The first piece of information regarding Gasteromycetes in Åland is the specimen of *Lycoperdon pyriforme* collected in the commune of Jomala by P.A. Karsten in 1881 (H). He did not, however, mention this record in his papers (Karsten 1889, 1893, 1898). Therefore, the first published information is a short note on *Phallus impudicus* (Elfving 1907) based on specimens collected in 1906 in Jomala (at least three collections in H; cf. Luther 1947a). Two more short notes on the same species were published by Brenner (1908) and Palmgren (1908).

Knowledge of the Gasteromycetes of the Åland Islands was built up slowly. By 1930 only three species were known from this area. Due to the efforts of Ole Eklund, Ernst Häyrén, Lauri E. Kari, Carl Th. Mörner and Göran Stenlid, six new Åland species were found during the 1930s. One further species, *Geastrum pectinatum* was probably also found during this period, because a note on its occurrence in the Åland Islands was published by Ingelström (1940).

During the 1940s several persons (mostly the same as during the 1930s and Otto von Schulmann) contributed to our knowledge of the Alandian Gasteromycete flora. Twelve or thirteen new species were found.

During the following two decades a slight decline in collecting activity occurred. Only four new species were found. During the 1970s and 1980s, attention was again paid to the fungi of Åland. This is partly the result of the efforts of the present author, who collected Gasteromycetes whenever he found them. Also, many other persons collected Gasteromycetes. These efforts contributed eleven new species of the Alandian Gasteromycete flora.

In the mid 1990s 37 species had been reported from the Åland Islands. This is a little more than half of the total species number of Finland. Several Gasteromycete species found in other parts of Finland, have eluded the collector's eye in Åland. This regards especially the hypogeous genus *Hymenogaster* and some *Bovista* species, particularly *B. paludosa* Lév. which presumably may be present in some of the Alandian rich fens.

List of taxa

The communes are abbreviated: Br = Brändö, Ec = Eckerö, Fi = Finström, Fö = Föglö, Ge = Geta, Ha = Hammarland, Jo = Jomala, Kö = Kökar, Ku = Kumlinge, Le = Lemland, Ma = Mariehamn, Sa = Saltvik, So = Sottunga, Su = Sund, Vå = Vårdö. Whenever possible, the co-ordinates according to the Finnish uniform grid system (Grid 27° E) are given with an accuracy of 10 km (3 + 2 numbers), or 1 km (4 + 3 numbers). Some information is too general for determining accurate co-ordinates.

Lycoperdales

Geastraceae

Geastrum elegans Vittad. — Le: Järsö, on the seashore opposite the island Bötesholm (6677:110–1), 17.IX.1948, G. Stenlid 639 (UPS; det. S. Sunhede). — Literature: Sunhede (1989), Ulvinen (1994).

Geastrum fimbriatum Fr. — Recorded seven times (Ec, Fi, Jo, Le, Su and Vå; H, TURA, UPS). First record: Ec: Torp, S of Skeppsvik, beneath a hazel shrub (669:08), 18.VI.1945, G. Stenlid (H). According to Stenlid (1947), the date was 20.VI.1945. — The species was found in deciduous stands, under a spruce and in a pine wood on sandy soil with the quite high pH of 6.8 (Huhtinen 1992). Three of the finds were from the calcareous area of Lumparn Bay. — Literature: Stenlid (1947), Huhtinen (1992).

Geastrum floriforme Vittad. — Jo: Hammarudda, on gravelly soil between junipers near the seashore (668:09), 4.IX.1949, G. Stenlid (UPS; det. S. Sunhede). — Literature: Sunhede (1989), Ulvinen (1994).

Geastrum pectinatum Pers. — Recorded 13 times (Jo, Le and Vå; H, OULU, TUR, UPS, herb. Sunhede). First record: Åland according to N. Stenlid (Ingelström 1940). — This species was mostly found in spruce woods. It usually grows in the needle litter, or on abandoned or dying ant-hills. A few finds were from luxuriant deciduous stands. All finds except two were located on the two adjacent islands Nåtö and Järsö in Le. — Literature: Ingelström (1940), von Schulmann (1961), Sunhede (1989).

Geastrum quadrifidum Pers.: Pers. — Recorded 14 times (Ec, Le and Vå; H, TUR, UPS). First record: Le: Nåtö (667:10 or 668:10), 16.VI.1946 (Stenlid 1947). — The species was recorded in mixed or spruce woods. The localities were often rather moist. One find was on an abandoned ant-hill. — Literature: Stenlid (1947), von Schulmann (1958, 1961).

Geastrum schmidelii Vittad. (syn. *G. nanum* Pers.) — Föglö: Björkör, sandy sheep pastured meadow, at a boulder about 40 m N of the main

building (6667:121), 26.VIII.1972, C.-A. Hæggeström (H). — Not seen since, although searched for in this place several times during 1973–95. — Literature: Hæggeström (1979), Sunhede (1989), Ulvinen (1994).

Geastrum striatum DC. — Kökar: Kyrkogårdsö, on and at an ant-hill on an old cow dung heap at Linus' cow shed (6674:156), 6.VI.1974, C.-A. Hæggeström (H). — Literature: Sunhede (1989), Ulvinen (1994).

Lycoperdaceae

Bovista pusilliformis (Kreisel) Kreisel — Only found twice. First record: Le: Nåtö, in a wooded meadow about 200 m E of Norrbacka (6680:109), 22.VIII.1971, C.-A. Hæggeström (H). — Each collection consists of one somewhat unripe fruit body, but the microscopical characters are typical of *B. pusilliformis* as described by Kreisel (1962, 1967). Especially the numerous minute pores and amphiseptal branching of the capillitial hyphae are characteristic features of this species as described by Kreisel (1962, 1967). According to Mr. M. Jeppson (Trollhättan, Sweden, letter in 1990), both specimens belong to *B. aestivalis* (Bonord.) Demoulin (Demoulin 1979). This species has a rather variable morphology, for instance capillitial hyphae with small and large pores, and a wide ecological amplitude occurring on dry open sandy soil, or on mull and clayey soils in deciduous woods. In my opinion, the variability both in morphology and ecology of *B. aestivalis* sensu Demoulin seems to be too great to make it a single species. Therefore, in accordance with Kreisel (1962, 1967, 1987) and Gross et al. (1980), I consider *B. pusilliformis* (Kreisel) Kreisel as a distinct species (cf. also Pegler et al. 1995). — Literature: Hæggeström (1997).

Bovista nigrescens Pers.: Pers. — Recorded 20 times (Ec, Fi, Kö, Le and Sa; H, TUR). First record: Ec: Storby, hillock with junipers (670:08), 13.VII.1935, E. Häyrén (H; confirm. F.-E. Eckblad 1963). — This species was often found in grazed meadows and pastures. Other localities are hazel stands, deciduous and mixed woods, on the spruce needle mat under a large

spruce and on *Fucus* wrack on the seashore beneath *Alnus glutinosa*. — Literature: Stenlid (1947), von Schulmann (1955).

Bovista plumbea Pers.: Pers. — Recorded 31 times (Br, Ec, Fi, Ge, Jo, Ku, Kö, Le, Sa and Su; H, TUR, TURA). First record: Ec, 15.VIII.1937, A. Södergård (H; det. C.-A. Hæggström 1990). — This species was found on open ground in pastures, at roadsides and in lawns. It is often found together with *B. nigrescens*. — Literature: Eklund (1943), Stenlid (1947), von Schulmann (1955).

Bovista dermoxantha Vittad. (syn. *B. pusilla* (Batsch) Pers.) — Stenlid (1947) reported two finds of *Lycoperdon pusillum* from Le. Specimens in UPS from one of the localities belong to *Bovista limosa* (see below). The other find from the island of Kungsholm (6685–6:114), 20.IX. 1946 (Stenlid 1947) may perhaps refer to *B. limosa*, or some other *Bovista* or *Lycoperdon* species. As no herbarium specimen is available its affiliation to the species cannot be verified. — Literature: Stenlid (1947).

Bovista limosa Rostr. — Le: Norrby, Segelgrundet (6686:115), 20.IX. 1946 (UPS; det F.-E. Eckblad 1954 (as *Bovistella echinella* (Pat.) Lloyd), confirm. C.-A. Hæggström 1996). — Literature: Stenlid (1947 as *Lycoperdon pusillum*).

Calvatia excipuliformis (Pers.) Perdeck — Recorded 16 times (Ec, Fi, Fö, Jo, Le and Ma; H, TUR, TURA). First record: Jo: Hammarudda, a meadow near the seashore (668:09), 23.VI.1949, E. Häyrén (H; det N. Malmström). — This species was found in dry and mesic meadows and in deciduous woods. — Literature: von Schulmann (1955, 1958, 1961).

Calvatia utriformis (Bull.: Pers.) Jaap — Recorded 24 times (Ec, Fi, Fö, Jo, Kö, Le, Sa and So; H, TUR). First record: Ec: Torp, deciduous grove (669:08–9), 14.VI.1937, L.A. Kari (TUR; det. C.-A. Hæggström 1989). — The species was found on sandy seashores, on sandy roads and roadsides, and in dry and mesic meadows. — Literature: Stenlid (1947), von Schulmann (1955).

Langermannia gigantea (Batsch: Pers.) Rostk. — Recorded three times (Br, Ec and Ge). First record: Br: Fiskö, Storholm, possibly 6.VIII.1934, O. Eklund (Luther 1947a). — Although no herbarium specimens are preserved, the determination of this easily recognisable species is almost certain, especially regarding the two finds of the 1980s, which were reported with photographs in the daily press. — Literature: Luther (1947a), Ahti & Korhonen (1974), Södergårdh (1980, 1987), Tuominen (1987), Ulvinen (1994).

Lycoperdon echinatum Pers.: Pers. — Le: Flaka, hazel grove near the road about 50 m W of the isthmus towards Apalholm (6674:118), 14.IX.1984, Eva Hinder (H). — Literature: Södergårdh (1984), Andersson (1994), Ulvinen (1994).

Lycoperdon ericaeum Bonord. var. *ericaeum* — Recorded 8 times (Le and Su; H). First record: Le: Nätö, on a flat rock outcrop by the midsummer pole (6680:109), 22.V.1984, C.-A. Hæggström 4754 (H). — This species was found in rock meadows and other dry meadows. One fruit body was also found on rather dry soil in a light deciduous wood.

Lycoperdon lividum Pers. — Recorded 8 times (Fi, Fö, Le and Su; H). First record: Su: Kastelholm, in a meadow at Jan Karlsgården on the slope towards the seashore (6700:117), 2.X.1982, C.-A. Hæggström 3990a (H). — The species was found in dry meadows.

Lycoperdon molle Pers.: Pers. — Recorded three times (Ha and Le; H, OULU, TUR). First record: Le: Nätö, Eskskär (6679:105–6), 3.IX.1949, L.E. Kari (TUR; det. group *molle* by V. Demoulin 1969; det C.-A. Hæggström 1990). — This species was found in deciduous or mixed woods and on a rocky slope in a cut forest.

Lycoperdon nigrescens Pers. — Only recorded twice (Le and So; H). First record: So: Norraby, mixed forest (668:14), 10.VIII.1974, Å. Nordström 311 (H; det. C.-A. Hæggström 1990). — The species was found in a mixed forest and in a dry meadow.

Lycoperdon perlatum Pers.: Pers. — Recorded 43 times (Ec, Fi, Fö, Ha, Jo, Le, Sa and Vå; H, TUR, TURA). First record: Ec: Storby, spruce wood, 12.VII.1935, Ernst Häyrén (H; det. W. Nyberg; det. V. Demoulin 1974). — This is one of the most common gasteromycete species in Åland. It was found growing among mosses and in the litter in mixed woods with pine and spruce, spruce woods, mixed woods (often below *Populus tremula*), deciduous woods with ash, birch, oak and hazel, and further on thin humus on rock outcrops, on decaying wood at a roadside, and even on the gravel at roadsides. — Literature: Stenlid (1947), von Schulmann (1955).

Lycoperdon pyriforme Schaeff.: Pers. — Recorded 42 times (Ec, Fi, Ha, Jo, Le, Ma and Vå; H, TUR, TURA). First record: Jo, 1.IX.1881, P.A. Karsten 507 (H; det P.A. Karsten 1883; det. V. Demoulin 1976). — Together with *L. perlatum* one of the most common gasteromycete species in Åland. It is associated with decaying wood, visible or buried in the soil. Of its substrates the following may be mentioned: in cracks and on decaying parts of living trunks of *Fraxinus excelsior*, *Malus sylvestris*, *Sorbus hybrida* and *Tilia cordata* and on stumps and dead trunks of *Alnus glutinosa*, *Betula* sp., *Fraxinus excelsior* and *Quercus robur*. A few roadside finds were also made.

Lycoperdon umbrinum Pers.: Pers. — Recorded 10 times (Ec, Le and Vå; H, OULU). First record: Ec, 1948 (von Schulmann 1955). — The species grew in spruce woods and at roadsides in woods. — Literature: von Schulmann (1955).

Vascellum pratense (Pers.: Pers.) Kreisel — Recorded six times (Ec, Jo and Su; H, TURA). First record: Su: Kastelholm, in a meadow at Jan Karlsgården on the slope towards the seashore (6700:117), 2.X.1982, C.-A. Hæggström 3990b (H). — This species was found in rock meadows and other dry meadows.

Mycenastraceae

Mycenastrum corium (Guers.) Desv. — Ec: Storby, sandy road-side at the post bridge

(6701–2:087), 1.IX.1936, C.T. Mörner (H; UPS). — Literature: Häyrén (1937), Mörner (1937), Ingelström (1940), Ulvinen (1976).

Melanogastrales Melanogastraceae

Melanogaster ambiguus (Vittad.) Tul. — Le: Nåtö, a wooded meadow in the Nature Reserve about 400 m ENE of Nåtö Biological Station, in the humified base of an ant-hill (6680:109), 30.VIII.1977, C.-A. Hæggström (H). — Not seen since, although searched for in this place every year during 1978–96. — Literature: Hæggström (1981), Ulvinen (1994).

Nidulariales Nidulariaceae

Crucibulum laeve (Huds.) Kambly — Recorded 10 times (Kö, Le and Vå; H). First record: Le: Nåtö (667–8:10), 13.IX.1946 (Stenlid 1947). — This species was found on decaying twigs of *Alnus glutinosa* and *Corylus avellana*, on the trunk of an old apple tree, on the spruce needle mat in a spruce wood, and on the gravelly soil at a car parking place. — Literature: Stenlid (1947).

Cyathus olla (Batsch: Pers.) Pers. — Le: Nåtö, on a decaying piece of chip board in the hazel grove at the Nåtö Biological Station (6680:109), 17.VIII.1973, C.-A. Hæggström (H).

Cyathus striatus (Huds.) Pers. — Recorded 7 times (Ha, Jo, Le, Ma and Su; H, TUR, TURA, UPS). First record: Le: Flaka, Apalholmen (667:11), 19.IX.1946, G. Stenlid (UPS; confirm C.-A. Hæggström 1996; according to Stenlid (1947), the habitat was on the soil in a dense hazel stand). — The species was mostly found on decaying wood (e.g. *Alnus glutinosa*). — Literature: Stenlid (1947), von Schulmann (1961).

Nidularia deformis (Willd.: Pers.) Fr. (syn. *N. farcta* (Roth: Pers.) Fr.) — Vå: Vargata, NNE of Pellas Norråker, on a heap of old timber (669–670:13), 3.XI.1962, P. Olofsson (OULU; confirm C.-A. Hæggström 1990).

Sphaerobolaceae

Sphaerobolus stellatus Tode: Pers. — Vå: Vargata, NNE of Pellas Norråker, on a heap of old timber (669–670:13), 3.XI.1962, P. Olofsson (OULU; confirm. C.-A. Hæggström 1990).

Phallales Phallaceae

Phallus impudicus L.: Pers. — Recorded 40 times (Br, Ec, Fi, Fö, Ge, Ha, Jo, Ku, Le and Su; H, TUR, TURA). First records: Jo, 1906, H. Snellman (H; confirm. C.-A. Hæggström 1989) and Fö: Näfversholm, 1906 (Brenner 1908). — The common stinkhorn has attracted the attention of botanists and laymen for most of this century. Therefore, it is the most frequently reported species in the literature. This fungus has been often found in luxuriant deciduous woods and wooded meadows. It has also been found in spruce woods, a mixed pine wood and in a lawn. — Literature: Elfving (1907), Brenner (1908), Palmgren (1908, 1921), Suomalainen (1916), Lindberg (1921), Hintikka (1931, 1933), Häyrén (1944), Luther (1947a, 1947b), Stenlid (1947), Södergård (1948), von Schulmann (1955, 1961), Eklund (1958), Tuomikoski (1959), Lange (1974), Ulvinen (1976), Hæggström (1981, 1996), Becker (1983), Svrček (1983), Härkönen (1984), Ryman & Holmåsén (1984), Andersson (1989) and Korhonen (without year).

Sclerodermatales Sclerodermataceae

Scleroderma areolatum Ehrenb. — Only recorded twice (Ec and Ma; TURA). First record: Ec, 11.IX. 1954 (von Schulmann 1955). — Literature: von Schulmann (1955, 1961).

Scleroderma bovista Fr. — Recorded three times (Ec and Vå; H, TUR). First record: Ec, 13.IX. 1954 (von Schulmann 1955). — Literature: von Schulmann (1955, 1961).

According to von Schulmann (1961) an unknown *Scleroderma* species was found by him in Mariehamn: Ytternäs in 1958. The collected

fruit bodies in H represent, however, the ascomycete *Elaphomyces asperulus* Vittad. (det. C.-A. Hæggström 1989).

Tulostomatales Tulostomataceae

Tulostoma brumale Pers.: Pers. — Kö: Österbygge, Storrevet (665:17), 20.VI.1948, G. Stenlid (UPS; confirm. C.-A. Hæggström 1996). — Literature: Andersson (1950), Kallio & Heikkilä (1963), Ulvinen (1976, 1994).

Boletales Rhizopogonaceae

Rhizopogon obtextus (Spreng.) Rauschert (syn. *R. luteolus* Fr. & Nordh.) — Recorded three times (Ec, Ma and Vå; H). First record: Ma: Ytternäs, VIII.1905, (668:10), M. Bergström (or Brändström, cf. Fries 1909) (UPS; det. Th.M. Fries, confirm. M.P. Martin 1992). — Literature: Fries (1909), von Schulmann (1955, 1961).

Rhizopogon roseolus (Corda) Th. Fries. — Only recorded twice (Ec, Sa). First record: Ec, 1948 (von Schulmann 1955, 1961). — It is doubtful whether *Rhizopogon roseolus* belongs to the mycoflora of Finland (Eckblad & Lange 1992). The specimens found by von Schulmann may perhaps belong to *Rhizopogon rubescens* Tul., which is fairly common in Finland (Ulvinen 1976, Eckblad & Lange 1992). Most of the Finnish specimens named *R. rubescens* were recently determined as *R. vulgaris* (Vittad.) M. Lange by Maria P. Martin (Barcelona; Spain). She regards *R. roseolus* as synonymous with *R. rubescens*.

Concluding remarks

The Gasteromycete flora of Åland is fairly rich in these species. The majority of the species are found in seminatural habitats such as wooded meadows and pastures of different kinds. The following seven species seem to be common, or fairly common in the Åland Islands: *Bovista nigrescens*, *B. plumbea*, *Calvatia excipuliformis*,

C. utriformis, *Lycoperdon perlatum*, *L. pyriforme* and *Phallus impudicus*. Several species are obviously rare, but among those which have been found only once or twice, some may be quite common. They have apparently eluded the collectors, because of their small size, e.g. *Nidularia deformis* and *Sphaerobolus stellatus*. The following 12 (or 13) species have been recorded only once: *Geastrum elegans*, *G. floriforme*, *G. schmidelii*, *G. striatum*, *Bovista dermoxantha* (dubious), *B. limosa*, *Lycoperdon echinatum*, *Mycenastrum corium*, *Melanogaster ambiguus*, *Cyathus olla*, *Nidularia deformis*, *Sphaerobolus stellatus* and *Tulostoma brumale*.

The following gasteromycete species are listed as threatened in Åland (Rassi et al. 1992, Ulvinen 1994):

– endangered: *Geastrum elegans*, *G. floriforme*, *G. schmidelii*

– vulnerable: *Geastrum striatum*, *Lycoperdon echinatum*

– in need of monitoring, rare: *Langermannia gigantea*

– in need of monitoring, insufficiently known: *Melanogaster ambiguus*, *Tulostoma brumale*

Gasteromycetes have been found in all the Alanian communes, with the exception of Lumparland. Specimens have been collected rather irregularly and from half of the communes only one to six collections are preserved in the herbaria. Surprisingly, the mainland communes of Hammarland, Geta and Saltvik belong to these inadequately known communes. The only communes with at least 20 collections are Eckerö, Jomala, Finström and Lemland. The rather large number (139) of collections in Lemland is partly due to the fact that some areas of the commune were quite thoroughly investigated by Göran Stenlid during the 1940s and since 1964 by several persons, among them the author, working at the Nåtö Biological Station. In fact, only a very few areas in Åland have been fairly closely investigated, among these areas are Storby in Eckerö and Nåtö, Apalholmen and Herrö in Lemland.

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