

prevented a wider distribution of the Roe deer in the past. The present wide distribution of Roe deer in Norway is of recent date and probably caused by other factors than climate and vegetation alone.

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SAMMENDRAG

Førhistoriske og tidlig historiske funn av rådyr i Norge

Rådyrets utbredelse i Norge i middelalderen og i førhistorisk tid er undersøkt med utgangspunkt i subfossile beinfunn fra arkeologiske utgravninger. Bein av rådyr er funnet i boplasser fra atlantisk tid (8000-5000 år før nåtid) i Østfold og Rogaland og fra det 13de århundre i Oslo. Kun 3, av de vel 800 beinfunnene som er undersøkt, inneholder bein av rådyr.

Resultatene tyder på at rådyret hadde liten utbredelse i Norge før 1600-tallet.

REFERENCES

- Bang-Andersen, S. (n.d.) *Rennarsundet – en nyopdaget bergmaling i Sandnes kommune, Rogaland*.
- Collett, R. 1912. *Norges Pattedyr I*. Aschehoug & Co., Kristiania.
- Danilov, P. I. 1979. *Novosely karel'skih lesov*. Petrozavodsk: 88 pp.
- Degerböl, M. 1951. Det osteologiske materiale. Pp. 52–84: in Lund H. E. (ed) *Fangst-boplassen i Vistehulen*. Stavanger.
- Ekman, J. 1973. Early Mediaeval Lund — the fauna and the landscape. *Archaeologica Lundensia V*: 110 pp.
- Ekman, J. 1987. Sammenfattningen av resultatene fråan gjennomgången av Hallundaboplassens benmaterial (djurdelen). Pp. 7–18: in Arkeologisk undersøkning 1969–1971, Hallunda, Botkyrka socken, Södermanland. Del IV: *Forlämningarna 13 och 69. –Riksantikvarieämbetet, Rapport UV*: 4.
- Formozov, A. N. 1946. *Snow cover as an integral factor of the environment and its importance in the ecology of mammals and birds*. Edmonton: 176 pp.

- Friis, P. C. 1613. *Norrgis Bescripfuelse*. In Halvorsen (ed) 1881. Samlede skrifter av Peder Clausen Friis. Kristiania.
- Hafsten, U. 1960. Pollen-analytic investigations in South Norway. Pp. 434–462: in Holtedahl (ed.) *Geology of Norway*, Oslo.
- Haugerud, R. E. 1989. Rådyret vandrer mot nord. *Ottar 1989–5*: 31–39.
- Hufthammer, A. K. 1991. *Det osteologiske materialet fra 5 steinalderlokaliteter ved Saugbruks i Halden*. Unpubl. Report, Zool. Mus., Bergen: 8 pp.
- Iversen, J. 1973. The Development of Denmark's nature since the last glacial. *Danmarks Geol. Unders. V*: 126 pp.
- Lepiksaar, J. 1986. The Holocene History of Theriofauna in Fennoscandia and Baltic Countries. *Striae 24*: 51–70.
- Lie, R. 1979. Osteologisk materiale fra «Oslogate 7». *De arkeologiske utgravninger i Gamlebyen. 2*: 108–123.
- Mangerud, J. 1990. Paleoklimatologi. Pp. 102–151 in: *Drivhuseffekten og klimautviklingen. Rapport 21*: Norsk Institutt for Luftforskning.
- Pulliainen, E. 1980. Occurrence and spread of the roe deer (*Capreolus capreolus* L.) in eastern Fennoscandia since 1970. *Mem. Soc. Fauna Flora fenn. 56*: 28–32.

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Short communication

THE LANDSNAIL *EUCONULUS FULVUS* (GASTROPODA: PULMONATA) FOUND ON WILLOW GROUSE (*LAGOPUS LAGOPUS*)

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A find of a fullgrown specimen of *Euconulus fulvus* (Müller) was made during an ectoparasitic investigation of grouse on Tranøya, Troms county, northern Norway.

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The land gastropod species of Fennoscandia have very different distributions. Some species are boreal. Others are arctic-alpine, a considerable number of species are ubiquitous and occur from the southernmost to the northernmost part of the area whereas many species have a western (atlan-

tic) distribution. Several species of the last category occur far north (>70°N) whereas they are absent in the eastern part of Fennoscandia, at least in the more northern parts of their distribution range. Such species are e.g. *Oxyloma pfeifferi* Rossmässler, *Columella aspera* Waldén, *Pupilla muscorum* (Linné), *Vallonia costata* (Müller), *V. pulchella* (Müller), *Limax marginatus* Müller, *L. tenellus* Müller, *Clausilia bidentata* (Ström), *Deroceras reticulatum* (Müller), *Arion fasciatus* (Nilsson), *A. distinctus* Mabille and *Trichia hispida* (Linné) (Kerney & Cameron 1979, Vader 1979, Andersen 1982). The four last species are synanthropic, at least in the northernmost part of their distribution range, and it is likely that they have been spread by anthropochore dispersal. The first eight species, however, show no special affinity to human-influenced habitats and it is unlikely that they have been spread northwards by man. These species have probably invaded Scandinavia from the south-southwest and the question is how land snails, which have very low mobility, may have been able to spread the whole way from the southernmost to the northernmost part of Scandinavia in the period that has elapsed after the last glaciation (approximately 15000 years). In this context it should be born in mind that it is unlikely that any land snails survived the last glaciation on refugia on the western coast of Norway (Waldén 1986).

According to investigations made in England, the large snail species *Cepaea nemoralis* (L.) moves approximately 3 meters a year (Udvardy 1969). Vagile specimens may certainly be able to move farther than this, but it is nevertheless difficult to accept that much smaller species than *Cepaea nemoralis* actively have been able to disperse throughout Scandinavia in the actual period. Some type of carriers must almost inevitably have been involved. Besides anthropochore dispersal, which is well documented especially among slugs (Lindroth et al. 1973) and rafting, biochore dispersal by birds was proposed as a possibility by Baker (1958). Snail eggs (probably of the amphibious genus *Succinea*) have also actually been found on the leg of a duck shot in Sahara (Udvardy 1969) whereas there hardly seems to be any documentation of transport of land snails or their eggs with birds.

In view of this the following observation is of interest. During an examination of ectoparasites on grouse *Lagopus lagopus* on Tranøy, Troms county, N Norway a full grown specimen of the land snail *Euconulus fulvus* (shell of about 3 mm breadth) was found in the feathers of one individual on June 18, 1962. This proves that sexually mature or pregnant snails may be transported by birds. Since land snails are hermaphrodite, and at least some species are capable of self-fertilization

(Kerney & Cameron 1979) the possibility that a single individual may found a new population on a new place is far greater than among species with separate sexes.

Although transport of snails or snail eggs with birds certainly is uncommon, we ascribe it great importance as a contributor to the recent distribution of land snails in Fennoscandia in view of the following facts: Many bird species spend much time on the ground, both during feeding, and by having their nests on the ground. Among these birds several are common and widespread in Fennoscandia. Birds are very mobile, and most species are migratory. Besides, it is rather likely that snails and their eggs are transported more often than may be indicated by the very few actual observations of such transport. It is suggestive that the find of *Euconulus fulvus* was made during an ectoparasitic examination, i.e. by a thorough investigation of the feathers of birds. Undoubtedly, very few birds are investigated in this manner, compared with all those that are ringed.

It is unlikely that fullgrown slugs and large snails are transported by birds, but transport of their eggs may be a possibility.

SAMMENDRAG

Et voksent eksemplar av landsneglen *Euconulus fulvus* (Müller) er funnet i fjærdrakten på en lirype under en ektoparasittisk undersøkelse på rype på Tranøya i Troms i 1962.

REFERENCES

- Andersen, J. 1982. New data on the terrestrial gastropods of northern Nordland and Troms counties, N. Norway. *Fauna norv. Ser. A* 3, 37—40.
- Baker, H. B. 1958. Land snail dispersal. *Nautilus* 71, 141—148.
- Kerney, M. P. & Cameron, R. A. D. 1979. *A field guide to the land snails of Britain and North-West Europe*. Collins, London.
- Lindroth, C. H., Andersson H., Böldvardsson, H. & Richter, S. H. 1973. Surtsey, Iceland. The development of a new fauna, 1963—1970. Terrestrial invertebrates. *Ent. Scand., Suppl.* 5.
- Udvardy, M. D. F. 1969. *Dynamic zoogeography with special reference to land animals*. Van Nostrand Reinhold Company, New York.
- Vader, W. 1979. En landisopode *Trichoniscus pusillus* på 70°N. *Fauna* 32, 121.
- Waldén, H. W. 1986. A comprehensive account of the Late Quaternary land Mollusca in Scandinavia. *Malak. Abh. Mus. Tierk. Dresden*, 11 (10), 105—133.

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