

Ant-hills in grassland restoration



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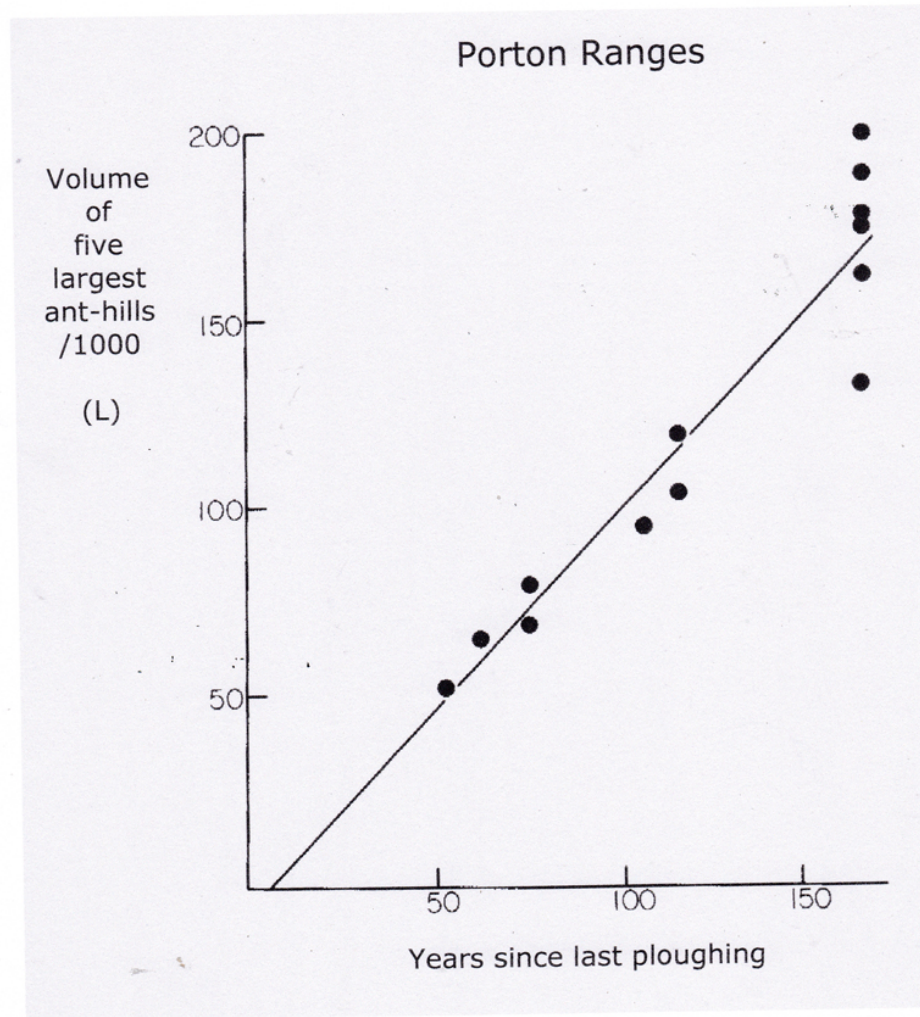


Report Number
512

A review of the invertebrates associated
with lowland calcareous grassland
English Nature Research Reports

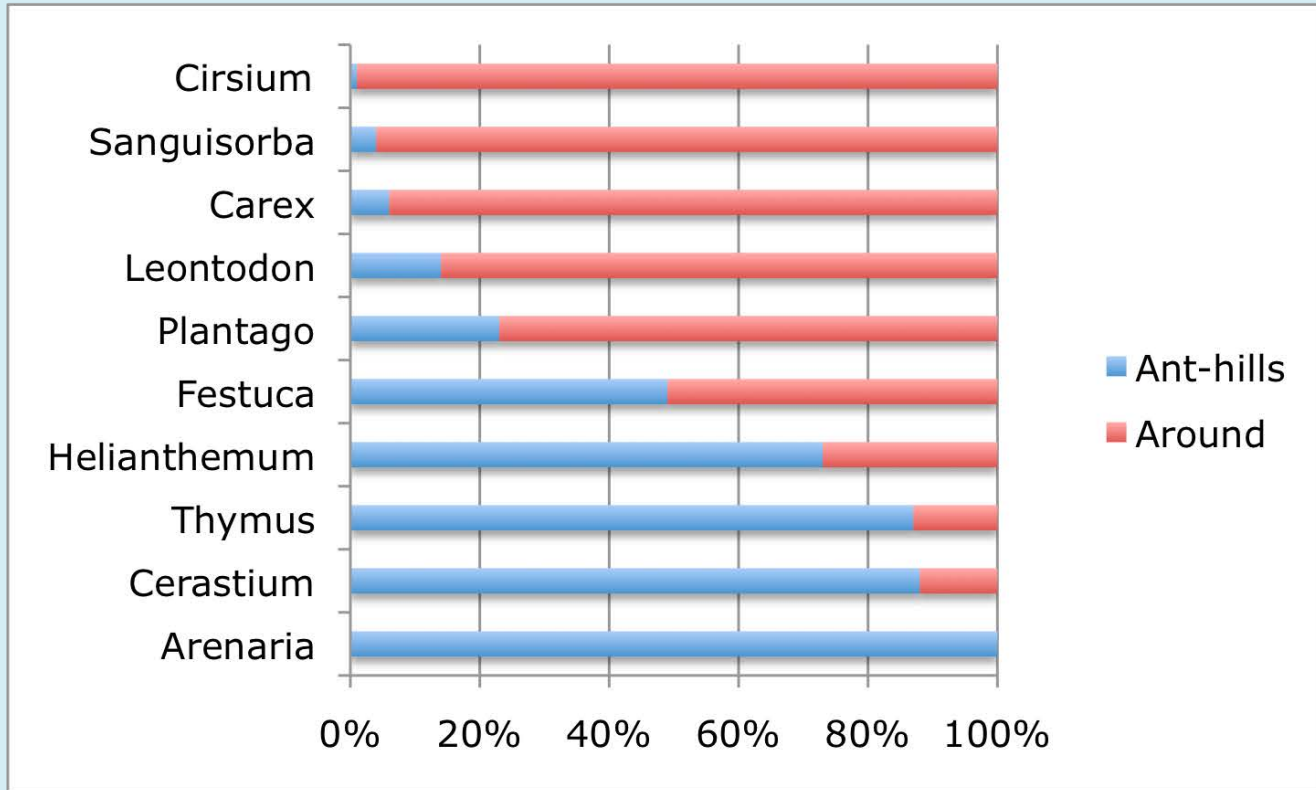


Molehills?

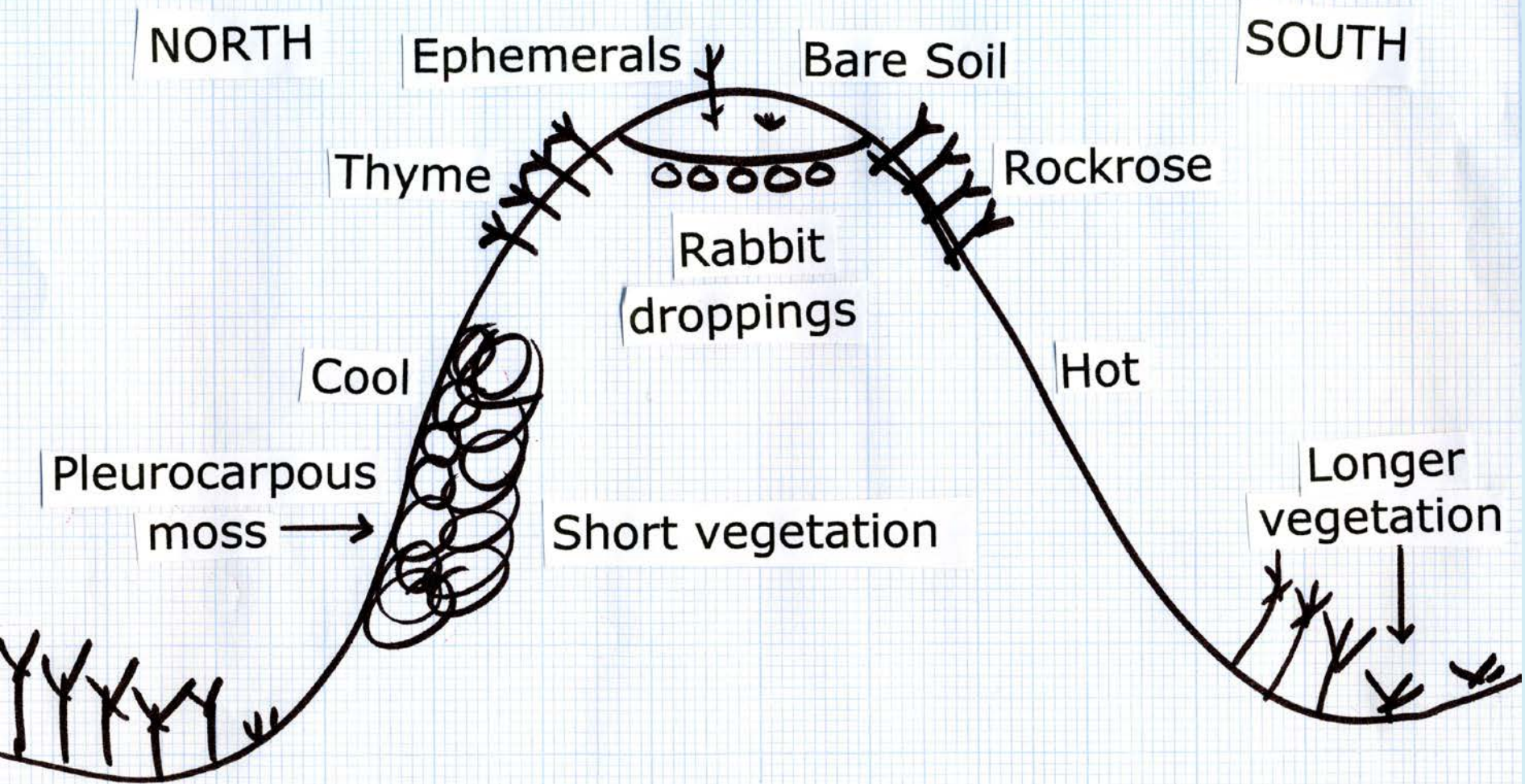


King TJ (1981) Ant-hills and grassland history.
Journal of Biogeography **8**, 329-334

- Main differences ant-hill and surrounding vegetation - consistent between tens of sites
- Thyme & Rock rose abundant on mounds
- Ephemerals confined to mounds
- Some Rosette species e.g. salad burnet, stemless thistle virtually absent
- Abandoned mounds; vegetation reverts







Influence of ants on grassland species richness

- Ant-hills provide permanently open bare soil micro-sites, N & S facing slopes, increase micro-habitat range.
- *Lasius flavus* **very** important in soil formation & aeration (e.g. Porton)
- In absence of ant-hills several short-lived plant species, acrocarpous mosses and fungi would not occur in the grassland.
- Numerous invertebrate species live with the ants e.g. lyceanid caterpillars (common blue, chalk hill blue) *Claviger testaceus*, *Platyarthrus hofmanseggi*, *Microdon* species, *Antennophorus*. Oviposition sites for grasshoppers, food source for green woodpeckers, dust bathing for pheasants.
- Ants farm aphids & coccids (17+ spp. recorded) on the roots of plants surrounding the ant-hills, particularly grasses. Reduction in vigor is likely to make them less competitive in relation to herbs. Increased growth rate of herbs?

Other influences of ant-hills in grasslands

- Reservoir for grassland plant and animal species during spells of lax grazing (Lullington); vegetation shorter
- Early spring bite for grazing animals – nitrification?
- Historical information about grasslands e.g Wytham-sizes, shapes, density, old mounds under scrub
- Aesthetic value – curvaceousness, floral massing



Statistics

Aston Rowant mature chalk grassland

Plot 800 m²

Active, Incipient abandoned ant-hills 2007,2015

238 active ant-hills

Largest ant-hill 1.13 m diameter

53 abandoned ant-hills

22 incipient ant-hills

Basal area ant-hills 91 m²

Surface area ant-hills 139 m²

Ant-hill surfaces compose 16.1% of pasture

Bare soil on ant-hills is 23 m² (2.8% of area)

Areas

Largest ant-hill 1.13 m diameter, 213 L volume

Ant Influence extends for half a metre diameter into surrounding grassland

(Pontin, root aphids, soil excavation zone)

Ant influence other ant-hills less, proportional to volume

Total basal area ant influence at least 171.6 m²

This is at least 21.5% of total area

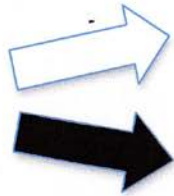
Dynamic

2007

2015



OCCUPIED



OCCUPIED

VOLUME
+ 30%

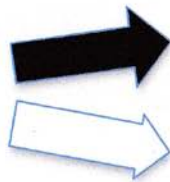


ABANDONED

VOLUME
- 19%



ABANDONED



ABANDONED

VOLUME
- 28%

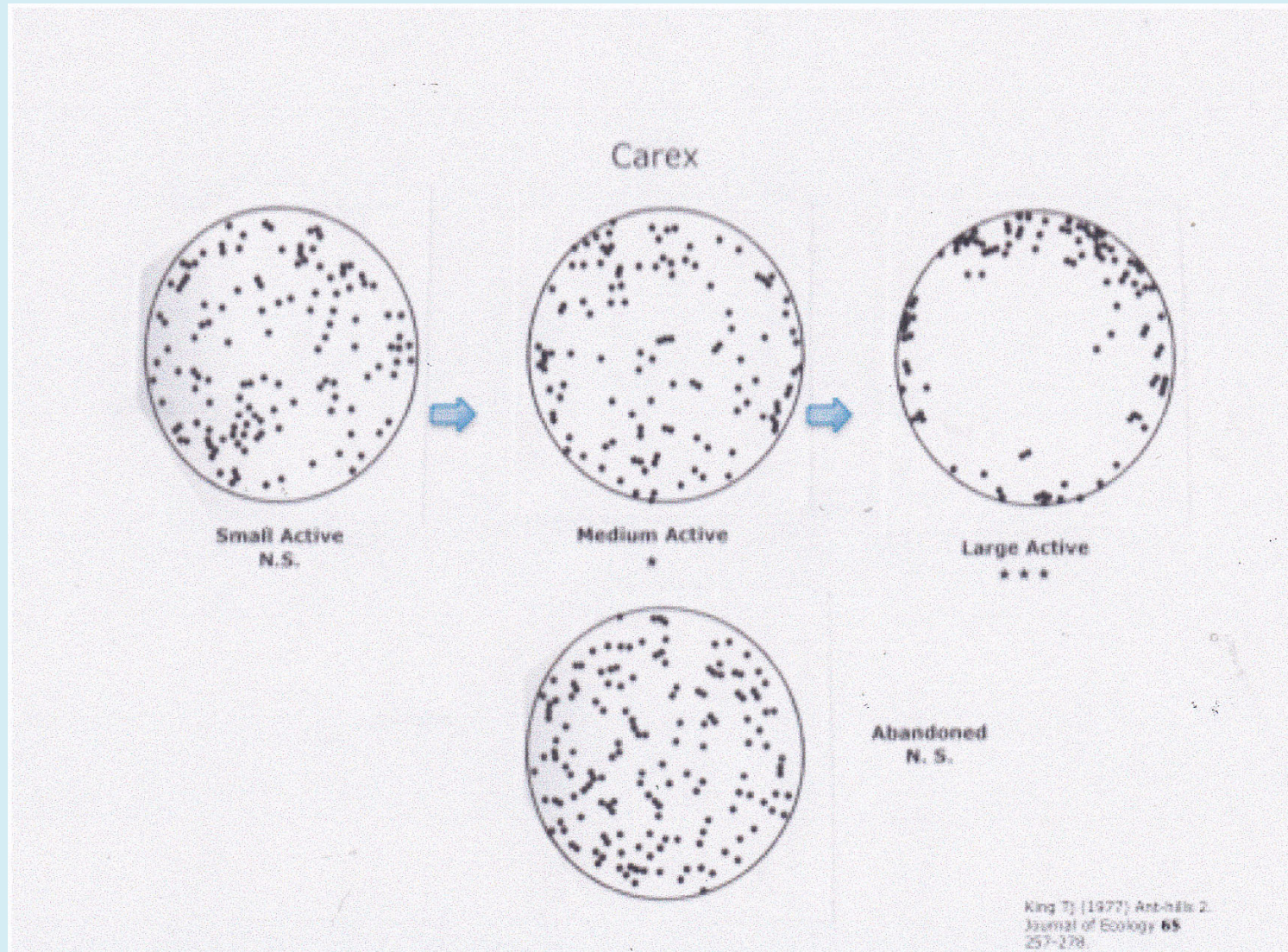


OCCUPIED

VOLUME
+ 18%



Abandoned mounds re-colonised by grassland species





Quotation

- “ant-hills occupy.... a large proportion of the old grazing land of this county, in some of which ant-hills are so abundant, that it is possible to walk over many acres, step by step, from one ant-hill to another, without ever coming upon the level ground; it must, however, be admitted that the most industrious occupiers, and best managers, have generally cleared their premises of such nuisances”
- Pitt W. (1809) General view of the agriculture of the county of Northampton.... Phillips, Northampton p.139

Transplantations

- Check ant-hill occupied
- **Recipient site:** remove/keep turf and excavated soil
- **Donor site:** excavate ant-hill (15-30 cm beneath). Place on side in wheelbarrow on its side, Collect debris from hole. Wheel ant-hill (upside down) to **recipient** site. Put debris in hole with ant-hill on top
- Add soil and turf from **recipient** site to **donor** site
- Graze regularly in spring as well as in autumn.
- Box AJ (1979) *Field Studies* **6**, 617-618 & Pontin AJ (1969) *J.anim.ecol.* **38**,747-754.

Conclusions

- Ant-hills cover a significant proportion (5-16%) of grassland surface, maintaining **permanently open bare soil** (2-3 %?).
"Sand dunes in the grassland"
- **Microhabitat heterogeneity** promotes a range of plant and animal species which would otherwise not occur
- Ant-hills are an **integral element** in pasture ecology. Ant activity influences pasture growth near the mounds. Incipient mounds colonised by seedlings are often abandoned and become pasture.
- Ant-hills can be reliably **transplanted**. Ant-hills should be considered for unmown field margins.

Annuals/ephemerals

ANT-HILL SPECIALISTS	ANT-HILL RARITIES	ARABLE FREQUENT
	<i>Erophila verna</i>	
<i>Arenaria serpyllifolia</i>	<i>Trifolium dubium</i>	<i>Aphanes arvensis</i>
<i>Cerastium fontanum</i>	<i>Catapodium rigidum</i>	<i>Cardamine hirsuta</i>
<i>Veronica arvensis</i>	<i>Bromus hordeaceus</i> <i>ferronii</i>	<i>Stellaria media</i>
<i>Myosotis ramosissima</i>	<i>Myosotis discolor</i>	<i>Myosotis arvensis</i>
<i>Rhodobryum roseum</i>	<i>Vulpia unilateralis</i>	<i>Polygonum rurivagum</i>
	<i>Ranunculus parviflorus</i>	<i>Sherardia arvensis</i>
	<i>Saxifraga tridactylites</i>	

Critical characteristics

- Arable weeds tend to have higher Ellenberg nitrogen scores
- All common ant-hill 'annuals' have autumn germination whereas rare ant-hill annuals and arable weeds have a variety of germination times
- Common ant-hill annuals all have seed masses <160 micrograms; seed mass tends to be a little higher in arable weeds, but higher in rare ant-hill species
- Some of the rare ant-hill species have a marked southerly distribution in UK

Possible explanations

- Typical arable weeds have seeds which germinate in spring, so that the growing plants are killed on ant-hills by drought before they can flower
- Their seeds lack an after-ripening requirement and their seedlings are killed by summer drought
- Typical annual weeds are more palatable to grazing animals than *Arenaria* and *Cerastium*
- The seeds of typical annual weeds are not dispersed so easily by rabbits and sheep as those of *Arenaria* and *Cerastium*
- The seeds of typical annual weeds are destroyed by the digestive systems of grazing animals whereas some *Arenaria* and *Cerastium* seeds pass through unaffected