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BIOLOGICAL EFFECTS OF THE SPREAD OF MYXOMATOSIS AMONG RABBITS

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The changes in vegetation which have occurred since the rabbits were killed by myxomatosis are being recorded at ten sites, most of them being Nature Reserves. These sites are scattered in the south of England, from near Canterbury in the east to Skomer Island, off the coast of Wales in the west; the most northerly is on Horn Heath, about 25 miles north-east of Cambridge.

Six of the sites are on the chalk, a soft form of limestone which is abundant in the south of England, and represent different types of vegetation — young grassland, old grassland, heath, juniper thicket, ash wood, beech wood and yew wood. The other sites are on different formations; one at Dungeness is on a bank of shingle near the sea; Horn Heath is on dry sandy grassland and heath; Broomhill Burrows in Pembroke, Wales, is on stabilised sand dunes by the sea, and Skomer Island, Pembroke, is on wet grassland and heath.

Records are repeated at the same fixed points, because that gives greater accuracy than would random sampling. Transects are marked out to cross the different types of vegetation at each site with iron posts at intervals of 100 feet (30 m). When the recording is done, a measuring chain is laid down between the posts, and records are made at 10 feet, 30 feet, 50 feet, 70 feet and 90 feet in each hundred. At each distance a standard point quadrat frame, with ten points 2 in. (5 cm) apart, is placed at right angles to the chain, and each species which touches each point is listed; the height of the turf is measured. It has been found that by this method records are repeated at the same spot without the interference of any permanent mark, and that the plants are not damaged.

Three of the transects are over 4,200 feet (1,2 km)

long and the total length of the ten transects is about 24.000 feet (over 7 km). No staff was available in the spring of 1954 when myxomatosis began to spread rapidly; therefore the urgent work of recording the vegetation while the rabbits were still abundant was started with the aid of students from Reading University. And, as sufficient permanent staff has not been available, the work for two years has been done partly with casual assistance. It is claimed that the point quadrat method is objective, reducing personal errors, and it has shown definite results, although recording has been done by different people at different times. Records have been made at each place once or twice a year.

The greatest changes, as might be expected, have been in the places where the vegetation was completely dominated by rabbits. For example, on one hundred feet of the transect at Lullington Heath (near Eastbourne) where the turf was $\frac{1}{4}$ " to $\frac{1}{2}$ " (1,3 cm) high in March, 1954, it was up to $3\frac{1}{2}$ " (9 cm) high in September 1955; the species of flowering plants had increased from 14 to 20 and the average number of species touched by each point increased from 1,3 to 3,0. On another hundred feet where the turf was 2" (5 cm) high, it grew to 9" (23 cm). The short plants of *Erica cinerea* which covered the ground on the chalk heath in March 1954 were obscured in September 1955 by *Calluna vulgaris* and by the grasses which formerly had been eaten short by the rabbits.

Similar effects were seen in other Nature Reserves on the chalk; more palatable grasses such as *Poa pratensis* and *Dactylis glomerata*, as well as leguminous plants, appeared in places where they had not been seen at the start of the experiment. *Holcus lanatus* and other grasses grew abundantly on the north slope of Old Winchester Hill Nature Reserve, formerly dominated by mosses; and masses of ash (*Fraxinus excelsior*) seedlings grew on the floor of the beech wood, formerly bare of vegetation. Seedlings of trees and shrubs have increased in the grasslands also.

On the dry sandy grassland of Horn Heath, where the rabbits died at the end of 1954, the grass near the sheltered belts grew even during the winter months. This increased growth continued during the summer of 1955 and more palatable grasses e. g. *Poa pratensis* appeared in places formerly dominated by *Agrostis* species. Where the *Calluna vulgaris* had been grazed to 1", it grew to 6" high during the first year of freedom from rabbits. On one hundred feet of the transect, where only

10 % of the points touched any plants in September 1954, 88 % did so in September 1955.

There was also an increased growth and an increased number of palatable species on the sandy grassland at Broomhill Burrows. On the transect at Dungeness, the bare shingle fell from 25 % to 22 %; both annual plants and perennial plants increased in quantity.

The point quadrat method records the changes in vegetative growth of the species. An even more spectacular change during the summer of 1955 has been the increased show of flowers on the chalk, both common species such as *Primula veris* and *Helianthemum chamaecistus*, as well as of rarer plants such as *Anemone pulsatilla* and many kinds of orchids. Some uncommon orchids have appeared in abundance where their presence was not suspected; for example, *Orchis militaris* which seemed to be extinct in Britain, is now known to flourish in two places.

Senecio jacobaea, a pernicious weed of some chalk pastures, flowered more abundantly than usual in 1955, the reason being that the seedlings became established in rabbit grazed turf during 1954, and that there were no rabbits to bite off the flowering stems in 1955. It is probable that this weed, and other poisonous plants like *Atropa belladonna* and *Cynoglossum officinale*, which were often abundant near rabbit warrens, may become rarer. The increased yield of grass is being utilised by increased numbers of stock in many places but, if the turf is ungrazed, it is possible that coarse grasses and woody plants may suppress some of the smaller, rarer herbs.

As it is two years or less since the rabbits were killed off in most places, it is not possible to prophesy future changes which may take place; they may become more rapid. But it is hoped that accurate records may be made of this most important event in the history of wild life in Great Britain.

Summary

1. The changes in vegetation are being accurately recorded on about 12,000 point quadrats on different sites on the south of England.

2. The turf is higher and a greater variety of plants is being found, especially of the more palatable grasses and legumes.

3. There are more seedlings of woody plants both in the grassland and in the woodlands.

4. There is a greater abundance of wild flowers, both common and uncommon.

5. As it is only two years or less since the rabbits died, one cannot prophesy future changes. They may become more rapid.

RESUME

1. Les transformations de la végétation après l'épidémie de myxomatose sont étudiées sur environ 12.000 quadrats dans différentes régions du sud de la Grande-Bretagne.

2. Le gazon est plus haut et on rencontre une plus grande variété de plantes, surtout parmi les légumineuses et les herbes succulentes.

3. Il y a davantage de jeunes plants d'arbres, autant dans les prés que dans les bois.

4. Les espèces communes ou rares de fleurs sauvages se retrouvent en bien plus grande abondance.

5. Etant donné que la disparition des lapins ne date que de deux années tout au plus, il est difficile de prévoir les changements dans l'avenir. Il se pourrait que ces transformations s'accélérent.

TERRE ET VIE (1956)



The effect of the disappearance of rabbits on vegetation.
The same spot at Lullington Heath, Sussex, in April 1954 (top photograph)
and in April 1956 (below).