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Short Communications

The phenology of *Sarcosagium campestre* observed over three years

A small number of lichens produce ephemeral fruit bodies that last for less than a year, they belong to genera such as *Absconditella*, *Epigloea*, *Sarcosagium*, *Steinia*, *Thelocarpon* and *Vezdaea*. Many are found in transient, terricolous, often man-made habitats and niches where competition is low. Poelt and Vežda (1990) have reviewed the sparse literature on ephemeral lichens. Since then, a two year study of *Thelocarpon laureri* in the Sheffield area (Gilbert 2001), has shown this species behaving as a spring ephemerophyte, the number of fruits peaking in April and May. Colonies persisted for 18 months (two fruiting periods). This short paper extends such observations to *Sarcosagium campestre*.

Sarcosagium campestre is locally abundant on the spoil heaps of disused lead mines in the Peak District of Derbyshire, 20 km west of Sheffield. In September 2000 small marked quadrats were set up at three mine sites all at an altitude between 315 to 325 m. At Tideslow Rake (43/160779) and Brandy Bottle Rake (43/197742) four 3 × 3 cm sample plots were sketched into a notebook and, with the aid of a hand lens, all fruit bodies plotted. These quadrats were used to record the course of development of individual apothecia. Duplication was introduced to allow for losses as the sites were grazed. At Magpie Mine (43/172681) a 30 × 30 cm quadrat was established that contained thousands of fruits; this site was used to assess general phenological trends. The quadrats were visited once a month for just over three years. After the first six visits the area was closed, owing to an outbreak of foot and mouth disease, so records for March and April 2001 are missing. If the sites were snow or frost covered, it was raining or the light was poor, a visit had to be delayed; due to the accumulative effect of such delays a month was lost, so that the number of observations made was 36. Results from the three sites were very similar, so that those from a small quadrat at Tideslow Rake and the larger one at Magpie Mine will be described as representative.

The thallus of *Sarcosagium campestre* is either not apparent or an indeterminate blackish brown gelatinous crust on which the apothecia appear. In the field, apothecia pass through four stages of maturity (Fig. 1). Fruit bodies emerge as tiny, pink, pruinose buds; the 'bud phase'. These enlarge and open into pink or purplish barrel-shaped apothecia with a concave disc surrounded by a well developed true exciple; this 'mature phase' contains ripe asci. With time the

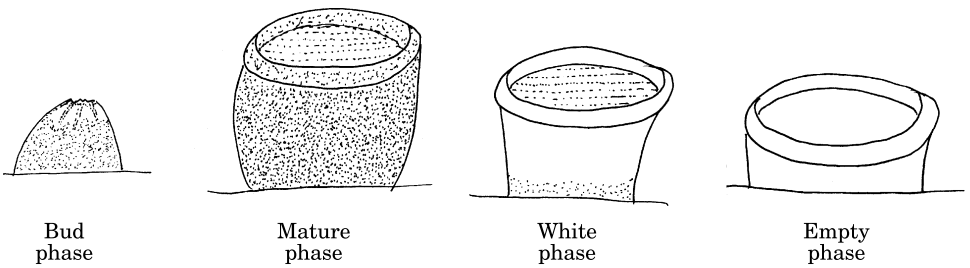

FIG. 1. *Sarcosagium campestre*, the four stages in the initiation, maturation, and decay of apothecia.

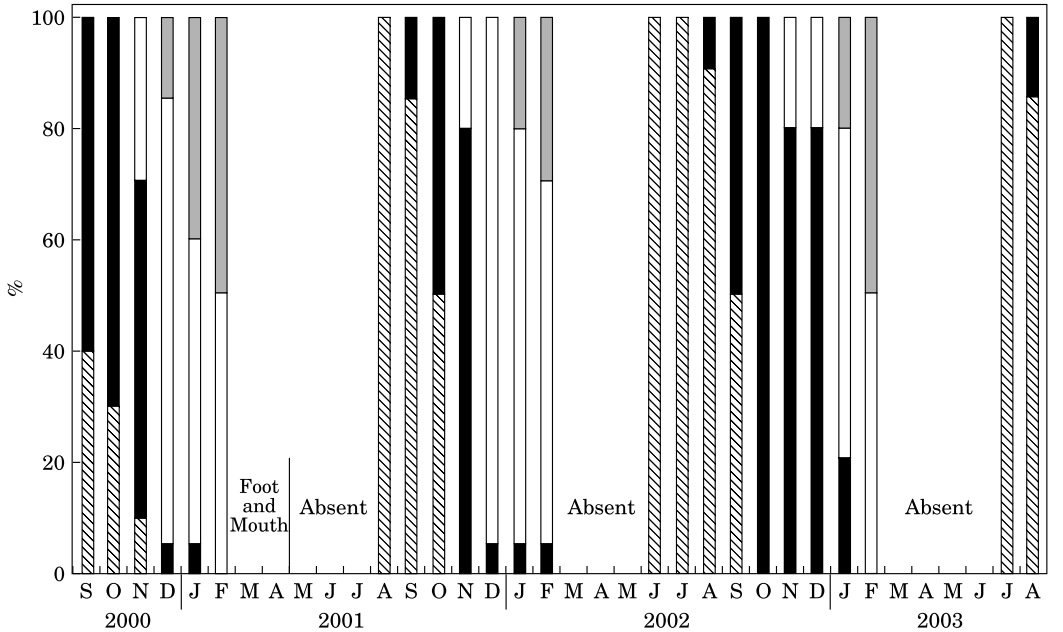

FIG. 2. The production of apothecia and their development phases in *Sarcosagium campestre* recorded over three years at Magpie Mine, Derbyshire. ▨: bud phase; ■: mature phase; □: white phase; ▩: empty phase.

apothecia become more cup-shaped, and their colour changes through orange to a dirty white; the 'white phase'. Soon after this the thecium gelatinizes and disperses to leave an empty white cup composed of the exciple; the 'empty phase'. This too, rapidly gelatinizes and disperses. Figure 2 shows the phenology of cohorts over three years at Magpie Mine. A distinct pattern can be seen of initiation in late summer, maturity in the autumn, senility during the winter period, and an absence during spring when it is impossible to detect the species. The figure also shows that the apothecia are not fully synchronized, for example the 'bud phase' and the 'mature phase' overlap. The final 'empty phase' is the briefest, while the 'bud', 'mature', 'white' and 'absent' phases each last approximately three months.

The Tideslow Rake population (Fig. 3), where individual apothecia were observed, showed much the same phenology though this population was always a week or two ahead of that at Magpie Mine. A more significant difference between the sites was that in the Tideslow and Brandy Bottle quadrats the number of apothecia produced each year was approximately the same while at Magpie Mine there was wide variation. Although numbers were not counted in the 30 × 30 cm quadrat at Magpie Mine, it was plain that in autumn 2000 thousands were present, in autumn 2001 a few hundred appeared, in autumn 2002 there were <100, while in autumn 2003 they were very sparse indeed. The only other observations on the life span of an *S. campestre* population have been made by Poelt and Vežda (1990) who reported that at Bron, Czechoslovakia, a thallus produced abundant apothecia in 1960 but none appeared in the following year. The longevity of individual thalli appears to be variable though in some instances they can persist for at least three years so it is only the apothecia that are ephemeral.

Each year the timing of the phases differed somewhat. In 2002 the first apothecial initials were observed in late June, while in 2001 and 2003 they did not appear until late July or early August. From the phase distribution of the populations in September

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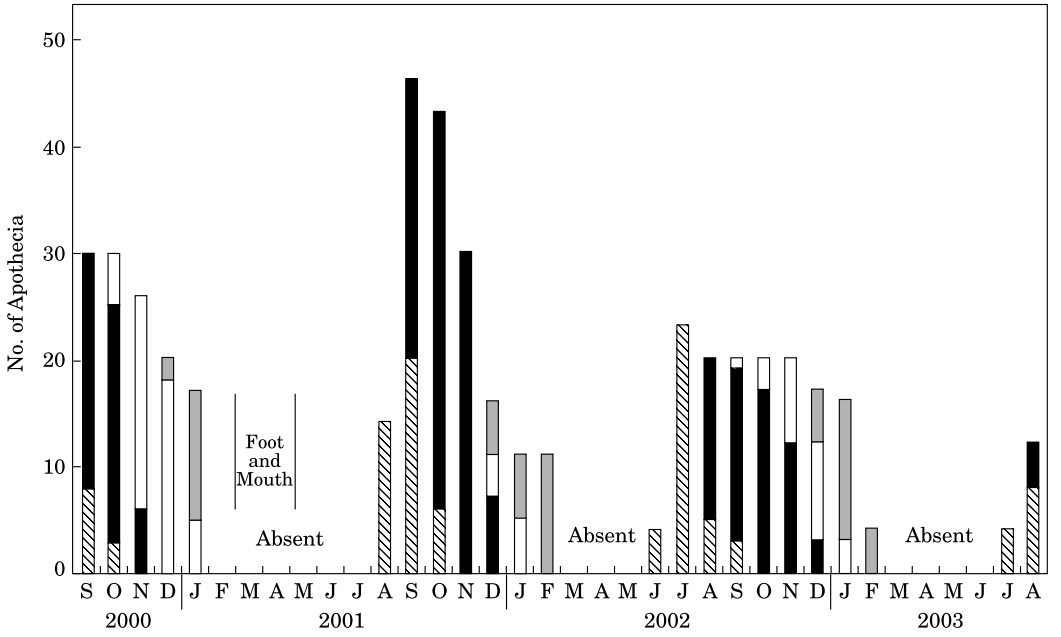

FIG. 3. The numbers of apothecia and their development phases in *Sarcosagium campestre* recorded in a 3 × 3 cm quadrat over three years at Tideslow Rake, Derbyshire. ▨: bud phase; ■: mature phase; □: white phase; ▩: empty phase.

2000, that was probably another early year. The time of first appearance, though probably climatically determined, was not obviously connected to a single factor such as temperature or rainfall. In this area the species behaves as an autumn ephemerophyte.

When interpreting the survey data the fact that *S. campestre* cannot be detected on mine spoil heaps in Derbyshire during spring and early summer is significant. To discover whether this is a national phenomenon, the dates of collection of herbarium specimens at the Natural History Museum, London (BM), and the Royal Botanic Garden, Edinburgh (E), were examined. Of the 33 collections 85% were made in the six month period July to December with a well defined peak in September and October. The five collections made outside this period were all from the west of Britain, usually coastal sites such as Harlech, Merionethshire, and Saunton, North Devon. Poelt and Vežda (1990) observed that while many ephemeral lichens grow as winter ephemerophytes in the lowlands, at higher altitudes they develop in the summer.

Recording systematic observations of this nature on ephemeral species is one way amateur or retired lichenologists, who do not have access to laboratory facilities, can further their subject.

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