

## An examination of J. W. Heslop Harrison's unconfirmed plant records from Rum

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### ABSTRACT

Between 1939 and 1958 Professor J. W. Heslop Harrison published a series of papers on the flora of the Hebridean island of Rum (v.c. 104). These provided records for over 600 species, including a number of remarkable discoveries which have long been the subject of considerable debate. Using a variety of information we critically examine the status of all the 113 of Heslop Harrison's taxa (excluding microspecies of *Taraxacum*, *Hieracium* and *Rubus*) which have not been recorded since 1957. The majority of these "losses" (46 taxa) were casual introductions, particularly weeds associated with cultivation, which declined due to land use changes. Taxonomic advances and the decline in the recording of critical taxa accounted for a further 30 taxa, whereas mis-identifications and genuine losses from semi-natural habitats were relatively minor (24 taxa). In contrast, Heslop Harrison appears to have deliberately introduced or mis-represented the native occurrence of 13 species, five of which were new to the British Isles. Eight of these were verified by independent botanists (*Carex bicolor*, *C. capitata*, *C. glacialis*, *Epilobium lactiflorum*, *Erigeron uniflorus*, *Juncus capitatus*, *Lychnis alpina* and *Polycarpon tetraphyllum*) and were most likely introduced to provide evidence for Heslop Harrison's theory of glacial survival. In contrast, the records for *Carex atrata*, *C. atrofusca*, *C. capillaris* and *C. norvegica* were never verified and are therefore rejected on distributional grounds. The presence of *Filago gallica* is rather more enigmatic although we suspect that it was unintentionally introduced and then spread into semi-natural habitats.

KEYWORDS: Arctic species, glacial survival, plant distribution, Hebrides.

### INTRODUCTION

Between 1939 and 1958 Professor J. W. Heslop Harrison (hereafter referred to as Heslop Harrison) and colleagues from King's College, Newcastle-upon-Tyne, published a series of papers on the flowering plants and ferns of the island of Rum as part of a larger investigation into the flora of the Hebrides (Heslop Harrison 1939b, 1951a, 1958; Heslop Harrison & Morton 1951; Heslop Harrison *et al.* 1941, 1942). Prior to these works very little botanical recording had been carried out on the island, with only two published accounts based on brief visits (Lightfoot 1778; Grieve 1886). By contrast, Heslop Harrison covered the island in much greater detail and as a result discovered over 250 new species, including many critical taxa, hybrids and aliens. This total included five Arctic species which were new to Britain and a further eight which represented notable, and in some cases very surprising, extensions in range in the British Isles. Although some of these species were shown to respected British botanists during the 1940s the authenticity of the records, particularly those species new to Britain, has long been the subject of considerable debate (Raven 1948, 1949; Young 1950; Sabbagh 1999a, 1999b). As a consequence, most of Heslop Harrison's most controversial species were not mapped in national atlases (Perring & Walters 1962; Preston *et al.* 2002) and have been questioned or ignored in major taxonomic works (e.g. Clapham *et al.* 1962; Jermy *et al.* 1982; Clapham *et al.* 1987; Stace 1997).

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Rum was designated a National Nature Reserve in 1957, just as Heslop Harrison was completing his researches on the island, but despite subsequent recording 113 taxa (excluding microspecies of *Taraxacum*, *Hieracium* and *Rubus*) that he claimed to have discovered, or were attributed to him, have not been refound. Subsequent checklists for the island (Eggeling 1965; Ball 1987) have not provided sources and therefore failed to clarify what species Heslop Harrison actually recorded and to sort out those records that are believable from those that are not. Sabbagh (1999a) has covered much of the background but dealt with very few species. In order to assess the scale of any alleged misrepresentation, and in preparation for a new flora of the island, we examine the likely status of these “lost” species. These are discussed in relation to advances in taxonomy, subsequent recording, land use history and the findings of John Raven’s (1948) confidential report on some of the rarer species, an edited version of which is published in this volume (Preston 2004).

Nomenclature follows Stace (1997) or Tutin *et al.* (1964–1980) where species are not covered by the former work.

#### THE ISLAND OF RUM

The island of Rum, or Rhum<sup>1</sup>, part of Watsonian vice-county 104, is the largest of the Small Isles of the Inner Hebrides (10650 ha) and lies approximately 8 km to the south of the Isle of Skye. The climate is highly oceanic, being wet and windy with low insolation, and rainfall varying from 1800 mm a year in the coastal zone to 3000 mm in the hills (Clutton-Brock & Ball 1987).

The geology of the island is extremely complex and dominated by an extinct Tertiary volcano (Emeleus 1987). The mountains in the south-east of the island mark its eroded root and are made up of ultramafic peridotites which weather rapidly to form magnesium-rich soils (Ragg & Ball 1964; Emeleus 1987; Looney & Proctor 1989). Nutrient deficiency limits the development of closed vegetation on these soils (Ferreira & Wormell 1971) and as result they support open communities with affinities to serpentine assemblages elsewhere in Scotland (Birse 1982; Looney & Proctor 1989; Proctor 1997). The granitic mountains to the west are botanically less interesting although basalt outcrops on Fionchra and Bloodstone Hill support populations of a number of Arctic-montane species. In contrast, much of the north of the island is made up of older Torridonian sandstones which give rise to extensive areas of species-poor blanket bog, wet heath and moorland dominated by *Molinia caerulea* (Ball 1987). Botanically this is rather monotonous terrain although there are isolated outcrops of limestone in the north west which support *Dryas octopetala* heath (Emeleus 1987).

Away from basic outcrops, species-rich grasslands and heaths are confined to coastal slopes and heavily grazed machair grasslands at the head of Harris and Kilmory Glens, whereas dunes and saltmarsh occur locally in some sheltered bays (e.g. Kinloch, Harris, Samhnan Insir and Kilmory). The remainder of the coastline is rocky, with numerous sea-cliffs and coastal gorges (geos). In comparison to other Hebridean islands the aquatic flora is of “restricted diversity” and comparable to poorer oligotrophic lochs in Scotland (Farmer 1984).

By 1957 the island was virtually treeless, with only very small populations of trees and shrubs surviving in rock clefts and inaccessible gorges near sea-level (Ball 1983). However, since the 1960s extensive tree-planting has led to the development of substantial blocks of native broadleaves and alien conifers where fencing has been erected to exclude deer grazing and commercial forestry techniques applied (Wormell 1968; Wood 2000).

One of the main factors affecting the vegetation of Rum is grazing by sheep and red deer *Cervus elaphus*, the latter re-introduced<sup>2</sup> for sport in 1845 (Magnusson 1997). By the time Rum was purchased by the Nature Conservancy (NC) in 1957 the island was severely overgrazed (Eggeling 1964; P. Wormell, in litt. 2002) and this led to the decision to remove the sheep and cull one-sixth of the deer population each year. This regime led to a general improvement in the condition of the

<sup>1</sup>Sir George Bullough changed the name to Rhum but the true Gaelic spelling is Rum or Rùm (Magnusson 1997).

<sup>2</sup>Native red deer disappeared from the island in the second half of the 18th Century as the human population increased to over 300 (Clutton-Brock & Guinness 1987).

vegetation (P. Wormell, in litt. 2002), although the loss of sheep grazing led to a decline in the diversity of the machair grassland in Harris Glen (Ball 1974). As a consequence a herd of Highland cattle were introduced in 1970. In contrast, recent research has shown that deer grazing sustained the diversity of the productive grasslands over the same period (e.g. *Agrostis-Festuca* grasslands, machair, sand dunes, etc.) whereas increased culling policies had a negligible effect on the species composition of unproductive swards and heaths (Virtanen *et al.* 2002). Current plans, however, are to reduce deer numbers by 50% over the next decade (Magnusson 1997; Loder 2000; Scottish Natural Heritage 2000).

The well preserved "lazy-bed" systems which are still visible in the major glens indicate the previous history of extensive cultivation on the island. These persisted into the 1820s although arable cultivation for fodder continued up till the mid 1970s when the island's dairy herd was removed (Love 1987; P. Wormell, in litt. 2002). These areas provided a habitat for a number of arable weeds which probably originated from imported seed. In addition, an extensive alien flora persists at Kinloch, where many species were introduced following the planting of policy woodlands and gardens following the construction of the castle around 1900.

#### BOTANICAL INVESTIGATIONS ON RUM

The earliest plant records for Rum were provided by the Reverend John Lightfoot who visited the island with Thomas Pennant in July 1772 (Lightfoot 1778). On the second day of their brief stay they visited Barkeval where they recorded *Arabis petraea*, *Minuartia sedoides* (the first British record), *Thalictrum alpinum*, *Tofieldia pusilla*, *Salix herbacea* and *Vicia orobus*, the latter "on the bank of a rivulet running down a mountain called Baikavall [Allt Slugan a' Choilich]" (Lightfoot 1778) where it still grows today. Other species recorded during their stay included *Eleogiton fluitans*, *Oxyria digyna*, *Populus tremula* (a dwarfed form), *Saxifraga oppositifolia*, *Sedum rosea* and *Silene acaulis*.

Over a hundred years later Symington Grieve (1886) published a much longer list of species recorded during a nine day visit in July 1884. This included 279 species (and 11 infraspecific taxa) most notably *Potamogeton praelongus*, the first record for western Scotland, *Carex bigelowii*, *Cystopteris fragilis*, *Eleocharis uniglumis*, *Equisetum variegatum*, *Draba incana*, *Dryopteris aemula*, *Myrica gale* and *Salix myrsinifolia*. Sixteen of Grieve's species have never been refound although many occur on neighbouring islands (e.g. *Gnaphalium supinum*, *Galium boreale*, *Potentilla crantzii*, *Scilla verna*; Table 5) (Currie & Murray 1983).

Professor J. W. Heslop Harrison (1881–1967) and colleagues from King's College, Newcastle-upon-Tyne began their Flora of the Inner and Outer Hebrides in 1934 (Heslop Harrison 1939a, 1941a). Their first expeditions to Rum were in 1937 and 1938, and their findings are summarised in Heslop Harrison (1939b). Although no mention is made of earlier works, this was the first "thorough examination" of the flora of the island and included around 450 taxa, of which just over 213 were new for the island. These included a small number of alien species as well as many critical taxa (e.g. of *Euphrasia*, *Hieracium*, *Rubus*, *Rosa*, *Salix*) which were covered to an extent that has not been repeated since. Notable discoveries from these trips which are still known to occur include *Arenaria norvegica* subsp. *norvegica* on Ruinsival and *Poa glauca*, *Saxifraga nivalis* and *Thlaspi caerulescens* on the basalt cliffs of Fionchra (Clark 1939).

This Flora was supplemented by further reports over the next 20 years based on irregular visits between 1941–1951 and a final expedition in 1957 (Heslop Harrison 1951a, 1958; Heslop Harrison & Morton 1951; Heslop Harrison *et al.* 1941, 1942). These provided many new records and also updated those of the rarer species, including a few of those which were subsequently viewed with suspicion. In addition, detailed papers were published on alien introductions (Heslop Harrison 1948a, 1951b), noteworthy sedges (Heslop Harrison 1945), pondweeds (Heslop Harrison 1948b), eyebrights (Pugsley 1945, 1946), roses (Heslop Harrison & Bolton 1938) and orchids (Heslop Harrison 1949).

In the summer of 1948 John E. Raven made a brief visit to Rum in order to investigate "the ever lengthening list of Hebridean rarities" which were being viewed by many of the "best qualified British botanists" with "growing suspicion" (Raven 1948). His trip coincided with a visit by W. A. Sledge and as a result his report to the Council of Trinity College, Cambridge provides

independent verification for the presence of *Carex bicolor*, *Epilobium lactiflorum*, *Juncus capitatus*, *Lychnis alpina* and *Polycarpon tetraphyllum* as well as speculation as to their status and origin. In the following year a selection of Raven's (1949) findings were also published in a very brief letter to *Nature* in which he rejected *Carex bicolor* and *Polycarpon tetraphyllum* as native species on the island as well as casting doubt over the origin of *Lychnis alpina*.

After the Nature Conservancy Council (NCC) purchased the island in 1957 a comprehensive checklist of the flora was completed by W. J. Eggeling (1965). This was based on Heslop Harrison's earlier papers plus additional records collated by NCC staff during the intervening period and includes 44 species new to the island, most notably *Hymenophyllum tunbrigense*, *Polygonum oxyspermum* subsp. *raii* and *Rhynchospora fusca*. However, the list is rather uninformative because details on localities and frequency appear to have been copied directly from Heslop Harrison's earlier papers leading to doubt as to whether Eggeling or his colleagues were merely citing Heslop Harrison's records or whether they had seen the plants for themselves between 1957 and 1965. Also confusing are records for six species not recorded by Heslop Harrison or any subsequent workers. We list these in Table 5 because these too have sometimes been attributed to Heslop Harrison but actually originate from the Eggeling checklist without supporting information. Similarly, a more recent checklist (Ball 1987), apparently based on Eggeling (1965), provides no indication of whether a species had been recorded in the intervening period (1965–1987) or, for new species, no indication of the locality, recorder, date or source.

Since the 1960s the vast bulk of botanical recording on Rum has been undertaken by visiting botanists and research workers. Most of the largest lochs were surveyed during the 1980s by Farmer (1984) and the NCC (and latterly Scottish Natural Heritage (SNH)) Loch Survey team and, in recent years, these have been extended to include all major water-bodies (Preston *et al.* 2000). In 1983 C.N. Page (1986) studied the pteridophyte flora and recorded 52 taxa, seven of which were new to the island (*Dryopteris expansa*, *Equisetum* × *dycei*, *E.* × *littorale*, *E.* × *rothmaleri*, *E.* × *trachyodon*, *Polypodium interjectum*, *P.* × *montaniae*). In addition, visiting botanical recorders have provided many modern records for rarer and critical species, as have vegetation surveyors funded by the NCC (Ferreira 1970) and SNH (Bates *et al.* 2002). A useful list of rarer Hebridean species on Rum is given by Currie and Murray (1983).

In recent years SNH have produced various provisional checklists which attempt to differentiate between species for which there are modern records and those that have not been seen for 20 years or more. However, these lists are rather uninformative because they include unconfirmed records for species not covered by earlier works. Furthermore, many common species lack modern records due to the lack of systematic recording on the island in recent decades. As a result, records published in the *New Atlas* (Preston *et al.* 2002) require updating. The current work is an attempt to update these lists as well as examine in detail those records attributed to Heslop Harrison in preparation for a modern Flora of the island.

#### HESLOP HARRISON'S RECORDS FOR RUM

In this paper we deal with species (excluding microspecies of *Hieracium*, *Rubus* and *Taraxacum*) recorded by Heslop Harrison between 1937 and 1958 but which have not been re-found. These are divided into four groups: a) dubious species, b) critical or difficult taxa, c) introductions and d) extinct native species (Tables 1–4).

##### DUBIOUS SPECIES

Heslop Harrison recorded 10 Arctic and three southern species which have been doubted since they were first reported in the 1940s (Table 1). The controversy surrounding J. E. Raven's (1948) report on some of these species is well, if rather luridly, told in a recent book and the reader is referred to Sabbagh (1999a, 1999b) for the full story, where similar doubts over "discoveries" in other groups are also discussed.

##### 1. Arctic and Boreo-Arctic species

###### *Carex atrata*

This Circumpolar Boreo-arctic Montane species was reportedly discovered in 1942 by the Allt Slugan a' Choilich on the slopes of Barkeval (Heslop Harrison *et al.* 1942), where it was

TABLE 1. SPECIES RECORDED FROM RUM BY J. W. HESLOP HARRISON WHICH ARE NOW CONSIDERED TO BE DOUBTFUL OR DELIBERATE INTRODUCTIONS (SEE TEXT FOR FURTHER DETAILS)

	HH (1939b)	HH <i>et al.</i> (1941)	HH <i>et al.</i> (1942)	HH (1945)	HH (1948a)	HH & Morton (1951)	Details of records and specimens in major herbaria
1. Arctic and Boreo-Arctic species							
<i>Carex atrata</i>			+	+			No specimens or independent evidence for its occurrence.
<i>Carex atrofusca</i>	+			+			No specimens or independent evidence for its occurrence.
<i>Carex bicolor</i>		+		+		+	The only British record. Known to have occurred but probably introduced; <b>E</b> .
<i>Carex capillaris</i>				+			No specimens or independent evidence for its occurrence.
<i>Carex capitata</i>							The only published British record is from S. Uist but seen on Rum in 1947 and 1948.
<i>Carex glacialis</i>				+			The only British record. Known to have occurred but probably introduced; <b>E</b> , <b>BM</b> .
<i>Carex norvegica</i>							No independent evidence for its occurrence; <b>E</b> .
<i>Epilobium lactiflorum</i>							The only British record. Never published but seen on Rum by Raven in 1948; <b>BM</b> .
<i>Erigeron uniflorus</i>				+			The only British record. Known to have occurred but probably introduced; <b>E</b> .
<i>Lychnis alpina</i>				+			Known to have occurred but probably introduced.
2. Southern species							
<i>Filago gallica</i>					+		Probably introduced in imported seed or hay.
<i>Juncus capitatus</i>	+					+	Probably an intentional introduction; <b>CMM</b> , <b>BM</b> .
<i>Polycarpon tetraphyllum</i>	+					+	Probably an intentional introduction; <b>BM</b> .

“scattered irregularly, and very sparingly, in tumbled grassy places along the burn...occurring at quite low altitudes” (Heslop Harrison 1945). It is not known whether it was shown to other botanists at this locality, although the original specimens were determined by E. Nelmes who thought them referable to forma *gelida* Sch. (Heslop Harrison 1944b). In Scotland *C. atrata* is a rare plant of ungrazed ledges above 550 m where there is some calcareous influence (Jermy *et al.* 1982; Preston *et al.* 2002). In contrast, the Rum site is below 250 m on acid Torridonian sandstone, although there is likely to have been some flushing of base-rich water from the corrie above (Coire Dubh).

*Carex atrofusca*

This Circumpolar Arctic-montane species was reportedly discovered “on boggy ground” on the southern turning of the Orval-Ard Nev ridge where it was recorded as “exceedingly rare” (Heslop Harrison 1939b, 1945). It is not known whether it was shown to other botanists in this locality and we have been unable to trace specimens. In Scotland *C. atrofusca* is a very rare plant of stony, usually micaceous flushes and more rarely of wet mountain ledges between 680–1000 m (formerly down to 540 m) in Perth, Westernness and Argyll (Jermy *et al.* 1982; Preston *et al.* 2002). The Rum site is below 450 m on microgranite and is therefore unlikely to have been suitable.

*Carex bicolor*

This Circumpolar Arctic-montane sedge was reportedly discovered in 1941 by Heslop Harrison on “sparsely clad” terraces between 380–450 m above the easternmost tributary of the Allt Slugan a’ Choilich on the eastern side of Coire Dubh (Heslop Harrison 1941b; Pugsley 1941; Heslop Harrison *et al.* 1942). Two separate colonies were recorded in this locality in 1942, 1943 and 1945 (Heslop Harrison 1945), and living material sent to Kew (Heslop Harrison 1944a), although by 1948 they had apparently been lost to landslides or deer (Raven 1948). A few years later a third colony was discovered at 285 m “on bare banks of gravel at the junction of two burns in the middle [floor] of Coire Dubh” where Raven (1948, 1949) located nine small plants in 1948. Although this habitat was similar to localities in the Canadian Arctic (Polunin 1941) and Iceland (Heslop Harrison 1951b), its habitat and associated species (which included *Juncus capitatus*, *Poa annua* and *Sagina apetala*) left Raven (1948, 1949) in no doubt that “*Carex bicolor*, in its only known British station, was deliberately planted there by human hand”. This accusation Heslop Harrison (1951b, 1951c) strenuously denied claiming that on Rum “*Carex bicolor* is a relict glacial form, and a genuine native”. The infection of some plants by a native gall-gnat *Pseudohormomyia granifex* was given as “unequivocal evidence” for its native status (Heslop Harrison 1951b). Whatever the truth, it apparently persisted for a number of years. In 1951 there were 28 plants and its range extended further along the Allt Slugan a’ Choilich (Heslop Harrison 1951b, 1951d), although overall numbers had declined due to “collecting” (Heslop Harrison & Morton 1951). It was recorded again in 1958 (Heslop Harrison 1958) and finally in 1961 when Heslop Harrison collected a number of specimens on his last visit to Rum (Sabbagh 1999a). It has not been recorded since. Polunin (1953b) included *C. bicolor* in a list of Arctic species present in the British Isles, although he noted it was considered to be an introduction by some botanists. It is a circumpolar species which occurs in Fennoscandia, Iceland, Greenland, North America, Siberia and the Alps (Hultén & Fries 1986).

*Carex capillaris*

This Circumpolar Boreo-arctic Montane sedge was reportedly discovered on the same slope as *Carex atrofusca* (Ard Nev-Orval ridge) but nearer to the Sròn an t-Saighdeir (Heslop Harrison 1939b, 1945). It was not reported again and it is not known whether any other botanists were shown specimens. In the British Isles this is a local plant of species-rich upland grasslands, overlying base-rich soils or areas flushed by base-rich waters (Jermy *et al.* 1982; Preston *et al.* 2002). The slopes of the Ard Nev-Orval ridge are almost entirely composed of volcanic microgranites and therefore are unlikely to have been suitable.

*Carex capitata*

This Arctic-montane sedge was reportedly discovered by Heslop Harrison at Loch Boisdale, South Uist (Heslop Harrison 1945) and subsequent works have continued to report this as the only British record (e.g. Jermy *et al.* 1982; Clapham *et al.* 1987). However, it is now known that a single specimen of *C. capitata* was shown to W. A. Sledge in 1948 on the eastern side of Coire

Dubh, Barkeval, growing close to the station for *Epilobium lactiflorum* (Raven 1948). In addition, the species was shown to J. R. M. Butler growing in cultivation with *Juncus capitatus* near Kinloch in 1947, and this led Raven (1948) to suspect that a single specimen had been "transplanted into its present station during the Professor's preparatory visit to the island" in June 1948. Heslop Harrison never published this remarkable record although he reported to Raven that the original colony consisted of six or seven plants (Raven 1948). We have been unable to trace specimens and it has never been recorded since. An Amphi-Atlantic species occurring in Fennoscandia, Iceland, North America, Siberia and the Alps (Hultén & Fries 1986).

*Carex glacialis*

This Arctic-montane sedge was reportedly discovered on dry stony ground on "the upper slopes of the southern turning of the Barkeval ridge" (Heslop Harrison 1945) where it was reported as very rare (Heslop Harrison 1944b). Living material was sent to Kew where it was confirmed by E. Nelmes (Heslop Harrison 1944a as *C. pedata*). Raven (1948) failed to find *C. glacialis* on his visit in 1948 although W. A. Sledge had been shown it a few days before. Heslop Harrison provides no further information on this remarkable find although it is mentioned in a number of phytogeographical papers (e.g. Heslop Harrison 1948c). Polunin (1953b) included *C. glacialis* in a list of Arctic species present in the British Isles although he noted that it was considered doubtful by some botanists. A circumpolar species which occurs in Fennoscandia, Iceland, Greenland, North America and Siberia (Hultén & Fries 1986).

*Carex norvegica*

This Circumpolar Arctic-montane sedge was reportedly discovered by Heslop Harrison on damp ground by a stream leading from the Cnapan Breaca to the east of Coire Dubh (Heslop Harrison *et al.* 1942; Heslop Harrison 1945). Despite the significance of this record it is not known whether independent botanists were shown the locality or sent material for determination, although there is a Heslop Harrison specimen in E labelled "Hallival, slopes towards corrie, Rhum, August 1944". In Scotland this is a very rare sedge of north-facing corries where it occurs above 700 m in association with snow-beds and on wet ledges, rocky slopes and turf overlying basic rock (Jermy *et al.* 1982; Preston *et al.* 2002). Although north-facing, the Rum locality is below 500 m on exposed volcanic breccias.

*Epilobium lactiflorum*

A Boreo-arctic species reportedly discovered by Heslop Harrison in Coire Dubh, Barkeval. As with *Carex capitata*, this record was never published although it was seen by W. A. Sledge and Raven (1948) growing "on the smaller of two mossy springs which rise side by side on the steep west-facing slope". This habitat is similar to its localities in Iceland (Löve 1983) but, as with *Carex bicolor*, Raven (1948) noted the lack of other Arctic-alpine species growing in the immediate vicinity of the colony. Polunin (1953a) lists this species as an Arctic plant which could conceivably occur in the British Isles. A classic Amphi-Atlantic species occurring in Fennoscandia, Faeroes, Iceland, Greenland and North America (Hultén & Fries 1986).

*Erigeron uniflorus*

This Arctic-montane species was reportedly discovered by Heslop Harrison growing with *Carex glacialis* "in very small quantity on two low, somewhat bare ledges on Barkeval" (Heslop Harrison *et al.* 1942). Living material was subsequently sent to the Royal Botanic Gardens at Kew (Heslop Harrison 1944a) and Edinburgh and it was also shown to W. A. Sledge in 1948 (Raven 1948). No further details were published on this remarkable find although Heslop Harrison (1948c) included a photograph of it "from its only British station; Isle of Rhum" in one of his phytogeographical papers. In Iceland, *E. uniflorus* (subsp. *eriocephalus*) occurs on gravelly flats at high elevation (Löve 1983). It is also known to occur at over 2200 m on nunataks in Greenland (Halliday 2002). A circumpolar species which also occurs in Fennoscandia, North America and Siberia, and with outlying populations (subsp. *uniflorus*) in the mountain ranges of Europe and Asia (Hultén & Fries 1986).

*Lychnis alpina*

A small population of this rare Boreo-arctic Montane species was reported from basalt cliffs on the north side of Fionchra (Heslop Harrison *et al.* 1942) and living material sent to Kew (Heslop Harrison 1944a). In 1948 a small colony of 10 to 12 weak rosettes was shown to W. A. Sledge and Raven growing "on a very steep little slope of loose gravelly soil" where it had apparently

colonised from the crags above (Raven 1948). Raven (1949) noted how weak these specimens looked in comparison to the more robust plants in Glen Clova. In Britain *L. alpina* has only been confirmed from two sites in Cumberland and Angus where it is confined to metalliferous soils between 600–700 m (Preston *et al.* 2002).

## 2. Southern species

### *Filago gallica*

This Mediterranean species was reportedly discovered growing “along the sandy path-side south of Kilmory” (Heslop Harrison 1939b). Although it was originally reported as “a remarkable discovery: new to Scotland” Heslop Harrison subsequently listed it as an introduction to the island (Heslop Harrison 1948a). In Britain *F. gallica* is a very rare archaeophyte of well-drained, sandy and gravelly soils in southeast England (Preston *et al.* 2002). The origin of the Rum plants are not known although it may have been an unintentional introduction in imported seed or hay which subsequently spread into semi-natural habitats.

### *Juncus capitatus*

This Southern-temperate rush was reportedly discovered growing on bare peaty ground by the track along the Kinloch Burn (Heslop Harrison 1939b). In 1948 Raven and W. A. Sledge were shown a small colony of around 30 plants “scattered about some small, bare, stony patches between the heather beside the track” in Kinloch Glen (Raven 1948). In addition, Raven discovered a few plants growing with *Polycarpon tetraphyllum* on the same track and, more remarkably, a few plants growing a few feet away from *Carex bicolor* at c.400 m in Coire Dubh. In addition, it was also shown to J. R. M. Butler growing in cultivation with *Carex capitata* near Kinloch in 1947 (Raven 1948). As with *Polycarpon tetraphyllum*, Heslop Harrison (1954) later denied that it was native on Rum despite having suggested that it colonised Coire Dubh from wind-dispersed seed (Heslop Harrison 1951b). We suspect that it was intentionally introduced to Rum, given its earlier “discovery” by Heslop Harrison on Raasay and Barra. Only known as a certain native from the Channel Islands, West Cornwall and Anglesey where it is confined to shallow soils around rock-outcrops, serpentine “pans” and dune-slacks which dry out in the summer months (Wigginton 1999).

### *Polycarpon tetraphyllum*

This Mediterranean species was reportedly discovered in 1938 as “a single plant growing in a rock crevice along the Kinloch Burn, Rhum; a new county record” (Heslop Harrison 1939b). In 1948 Raven and W. A. Sledge were shown a few small colonies scattered along the Kinloch track, where it was growing in association with *Juncus capitatus* and *Wahlenbergia lobelioides* (Raven 1948; see Preston 2004). These had originally been determined by A. J. Wilmott as a Mediterranean variety known from Malta and Greece and this led Raven to conclude that *P. tetraphyllum* was undoubtedly an introduction to Rum (Raven 1949). The suggestion that it was originally treated as a native was vehemently denied by Heslop Harrison (1951b) and in the same year as Raven’s visit he included it in a list of introductions, stating that it was “clearly an escape from the grounds, or brought in with deer food” (Heslop Harrison 1948a). This species has only been confirmed as a probable native from coastal sites in the Channel Islands, Dorset, South Devon and Cornwall where it occurs in a variety of habitats including sunny banks, shingle, stone walls, bulb fields and gardens (Wigginton 1999).

## CRITICAL AND DIFFICULT TAXA

Heslop-Harrison was the last botanist to deal with critical taxa on Rum in any detail and as a result there are 30 taxa which have not been recorded since his day (Table 2). Some of these belong to genera which have been the subject of significant taxonomic revisions since the 1940s. For example, the plasticity of *Cochlearia* species has long presented taxonomic difficulties for British botanists, particularly *C. pyrenaica* which is thought to merge into *C. officinalis* s.s. in coastal localities in the U.K. (Rich 1992). In the absence of herbarium material, older records for this

TABLE 2. CRITICAL AND DIFFICULT TAXA RECORDED ON RUM BY J.W. HESLOP HARRISON BUT NOT RELIABLY RECORDED SINCE 1957<sup>1</sup>

Taxon	HH (1939b)	HH (1941)	HH <i>et al.</i> (1942)	HH (1948b)	HH (1951a)	HH & Morton (1958)	HH (1958)	Details
<i>Arctium lappa</i> <sup>2</sup>	+							Probably an error for <i>A. minus</i> .
<i>Arctium nemorosum</i>	+							Taxon unlikely to have been recorded reliably at the time.
<i>Callitriche obtusangula</i>						+		Probably an error for <i>C. stagnalis</i> .
<i>Cochlearia danica</i>					+			Overlooked?
<i>Cochlearia micacea</i> <sup>3</sup>								Rejected on distributional grounds.
<i>Cochlearia pyrenaica</i> <sup>4</sup>								Perhaps an error for <i>C. officinalis</i> s.l. which still occurs.
<i>Crepis mollis</i>	+							Rejected on distributional grounds.
<i>Dactylorhiza incarnata</i> × <i>purpurella</i> <sup>5</sup>	+				+			A sporadic hybrid and therefore likely to have been overlooked?
<i>Dactylorhiza maculata</i> subsp. <i>rhoumensis</i> <sup>6</sup>								Now thought to be of dubious status.
<i>Dactylorhiza majalis</i> subsp. <i>occidentalis</i> <sup>7</sup>						+		Overlooked?
<i>Dryopteris carthusiana</i> <sup>8</sup>	+					+		Doubted by Page (1986) although not rejected outright.
<i>Empetrum nigrum</i> subsp. <i>hermaphroditum</i>					+			Only one unconfirmed record since 1957; possibly overlooked?
<i>Epilobium montanum</i> × <i>obscurum</i>					+			A sporadic hybrid and therefore likely to have been overlooked?
<i>Euphrasia arctica</i> subsp. <i>arctica</i> <sup>9</sup>	+							Overlooked?
<i>Euphrasia foulensis</i>	+							Overlooked?
<i>Euphrasia tetraquetra</i> <sup>10</sup>	+							Rare and taxonomically difficult in Scotland.
<i>Galium sternerii</i>	+					+		Rejected on distributional grounds.
<i>Myosotis scorpioides</i> <sup>11</sup>	+							Possibly overlooked? Recent SNH unconfirmed record.
<i>Nymphaea alba</i> subsp. <i>occidentalis</i>	+							Overlooked?
<i>Potamogeton pusillus</i>								Probably an error for <i>P. berchtoldii</i> .
<i>Rhinanthus minor</i> subsp. <i>lintonii</i> <sup>12</sup>	+							Overlooked?
<i>Rhinanthus minor</i> subsp. <i>monticola</i>	+							A sporadic hybrid and therefore likely to have been overlooked?
<i>Rosa pimpinellifolia</i> × <i>sherardii</i>	+					+		Rejected on distributional grounds.
<i>Sagina</i> × <i>normaniana</i> <sup>13</sup>	+							A sporadic hybrid and therefore likely to have been overlooked?
<i>Salix cinerea</i> × <i>repens</i>	+							Rejected on distributional grounds. Probably <i>S. phylicifolia</i> .
<i>Salix myrsinifolia</i>								Overlooked? Not recognised by Stace (1997).
<i>Thalictrum minus</i> subsp. <i>arenarium</i>	+				+			Overlooked? Not recognised by Stace (1997).
<i>Thalictrum minus</i> subsp. <i>majus</i>	+							Rejected on distributional grounds..
<i>Thymus pulegioides</i> <sup>14</sup>	+							Rejected on distributional grounds.
<i>Viola reichenbachiana</i> <sup>15</sup>	+							Rejected on distributional grounds. Probable error for <i>V. riviniana</i> .

1. *Festuca prolifera* and *Rosa glaucophylla* were recorded by Heslop Harrison (1939b) but are excluded from these lists because they cannot be satisfactorily assigned to modern species (C. A. Stace, in litt. 2002). *Salix arbuscula* (Heslop Harrison et al. 1941) is also excluded as it was subsequently thought to be an "unusual form" of *S. phylicifolia* (Heslop Harrison 1958). 2. As *Arctium major*. 3. As *Cochlearia arctica* (= *C. micacea* E.S. Marshall). 4. As *Cochlearia alpina*. 5. As *Orchis latifolia* × *purpurella*. 6. As *Orchis ericetorum* subsp. *rhumensis*. 7. As *Orchis majalis*. 8. As *Lathraea spinulosa*. 9. As *Euphrasia borealis*. *Euphrasia brevifolia* has been interpreted as *E. arctica* subsp. *borealis* and *E. borealis* as *E. arctica* subsp. *arctica* (C. A. Stace, in litt. 2002). Both were reported as separate taxa for Rum in 1939 (Heslop Harrison 1939b). 10. As *Euphrasia occidentalis*. 11. As *Myosotis palustris*. 12. As *Rhinanthus drummond-hayi*. 13. As *Sagina scotica*. 14. As *Thymus ovatus*. 15. As *Viola sylvestris*.

species are best interpreted as either *C. officinalis* subsp. *officinalis* or subsp. *scotica*, both of which have been recently confirmed for Rum. Older records for *Cochlearia arctica* on the other hand (e.g. Heslop Harrison *et al.* 1941; Eggeling 1965) are more difficult to interpret, having been variously assigned by different authors (C. A. Stace, in litt. 2002). Heslop Harrison, however, gives the synonym “= *C. micacea* E. S. Marshall” and therefore we suspect he is referring to *C. micacea* s.s., which, in the absence of herbarium material, should be rejected on distributional grounds. Similarly, older records for *Arctium lappa* (scarcely known from Scotland) and *Euphrasia arctica* subsp. *arctica* (confined to Orkney and Shetland) are unlikely to be reliable.

There is no doubt that some species in Table 2 represent mis-identifications. For example, the presence of *Dryopteris carthusiana* on the island, which was considered to be “fairly common” by Eggeling (1965), has recently been doubted by Page (1986), though he was reluctant to dismiss the record entirely. In addition, a recent survey of the major lochs of Rum failed to find *Potamogeton pusillus* which may have been originally confused with *Potamogeton berchtoldii* (Preston *et al.* 2000). Other taxa which might be included in this category include *Crepis mollis*, *Galium sternerii*, *Sagina* × *normaniana* and *Thymus pulegioides*.

A number of species are likely to have been overlooked because they have not been subjected to detailed study for many years. Obvious examples in Table 2 include uncommon hybrids, such as *Epilobium montanum* × *obscurum*, as well as *Euphrasia* and *Dactylorhiza* taxa, which were both the subject of detailed investigations during the 1940s (Pugsley 1945, 1946; Heslop Harrison 1949). Given their wider Hebridean distributions, *Euphrasia foulaensis*, *Dactylorhiza majalis* subsp. *occidentalis* and *D. maculata* subsp. *rhoumensis* presumably still occur although the last is now considered to be of dubious subspecific rank (Stace 1997). Other species which might be included in this category are the subspecies of *Rhinanthus minor* and *Empetrum nigrum* subsp. *hermaphroditicum*, for which there is a single unconfirmed record.

Finally, there are a number of taxa which are no longer recognised by British botanists (e.g. subspecies of *Thalictrum minus*) and several critical taxa (not included in Table 2) that cannot be assigned to any modern species (*Euphrasia curta*, *E. eurycarpa*, *Festuca prolifera*, *Rosa glaucophylla*) (C. A. Stace, in litt. 2002).

#### ACCEPTED INTRODUCTIONS

Accepted introductions to Rum are listed in Table 3. These can be divided into two main groups: species planted for ornamental, herbal or medicinal purposes (22 taxa) and those associated with arable cultivation and livestock production (24 species).

With the exception of *Crataegus laevigata*, all the planted introductions were recorded from Kinloch where they were planted for ornament (e.g. *Astilbe thunbergii*, *Picea abies*, *Salix fragilis*, *Sorbus aria*, *Viola cornuta*) and domestic use (e.g. *Prunus* spp.) or introduced with imported trees (e.g. *Fallopia japonica*, *Moehringia trinervia*; *Wahlenbergia gracilis*). This list also includes a number of herbal and medicinal relics which would have been traditionally planted around crofts (e.g. *Artemisia absinthium*, *Inula helenium*).

By far the largest group of introduced species, however, are crop and livestock weeds. Although some of these are likely to have been casuals brought in with imported grain (e.g. *Conringia orientalis*, *Mentha arvensis*, *Phalaris canariensis*) or hay (e.g. *Festuca pratensis*, *Gnaphalium luteoalbum*, *Linum perenne*, *Medicago lupulina*), the loss of many presumably resulted from the decline of arable cultivation since the 1930s (Magnusson 1997). This process is likely to have eliminated opportunities for regeneration of once common crop weeds such as *Chenopodium album*, *Chrysanthemum segetum*, *Fallopia convolvulus*, *Galeopsis* spp., *Geranium* spp., *Urtica urens* and *Veronica agrestis*.

#### EXTINCT NATIVE SPECIES

Some of the species listed in Table 4 may reflect genuine losses from semi-natural habitats due to changes in management. For example, *Pilularia globulifera* (now re-introduced to pools at Harris) probably disappeared when cattle and sheep were removed in 1957 (Magnusson 1997). This may

also account for the loss of *Oenanthe lachenalii* and *Lemna minor* which occurred with *P. globulifera* in a pool behind the beach at Harris.

In contrast, some species may have been ephemeral colonists which persisted for a few years. For example, *Platanthera chlorantha* was recorded as abundant in 1947 and 1948 (Heslop Harrison 1951a) but had gone by 1951 (Heslop Harrison & Morton 1951)<sup>3</sup>. In comparison to these genuine losses, other species may have been overlooked due to their extreme rarity (e.g. *Circaea lutetiana*, *Hypericum perforatum*, *Gnaphalium sylvaticum*, *Pyrola minor*, *Sanicula europaea*) or confinement to inaccessible habitats. For example, *Orobancha alba* has only been recorded from the treacherous west-facing slopes of Bloodstone Hill which are very difficult to survey (Heslop Harrison 1939b). In addition, the only records for *Zostera marina* are "cast up" material on the beaches around the north of the island (Heslop Harrison 1958; Eggeling 1965).

Several of the species listed in Table 4 are likely to be errors for more common species. The record of *Draba norvegica* from Fionchra (found by H. R. Fletcher) has long been considered an error for *D. incana* which occurs on the same cliff (Eggeling 1965), although the former species has recently been discovered on Skye (Currie & Murray 1983). Other species which might be included in this category include *Potamogeton coloratus* (*P. polygonifolius?*), *P. pectinatus* (aquatic form of *Juncus bulbosus?*), *Elytrigia atherica* (*E. juncea?*) and *Leontodon hispidus* (*L. saxatilis?*).

#### DISCUSSION

The majority of the species listed in Tables 2–4 were undoubtedly present on Rum but have been "lost" since the 1950s due to a variety of reasons: taxonomic changes and a decline in the recording of critical taxa are likely to account for 30 species, whereas 46 were most probably casual escapes from gardens or weeds associated with management practices (e.g. arable cultivation) which no longer take place on the island. In contrast, mis-identifications and genuine losses of native species from semi-natural habitats appear to have been relatively minor (24 species; Table 6).

In contrast, 13 of Heslop Harrison's most remarkable discoveries appear to have been misrepresentations. Although we cannot rule out the involvement of a third party, we suspect that some, if not all, were deliberately introduced to the island by Heslop Harrison, and later "discovered" by him or his co-workers. We have no idea where he obtained this material or indeed whether the plants were cultivated away from the island, although Sabbagh (1999a) has some thoughts on the matter. We doubt that other members of his expeditions (including members of his family) were party to this deception, although it has been suggested that his son, J. Heslop Harrison, knew of his father's activities and warned him against further fraudulent actions. Indeed his 1953 paper to the Botanical Society of the British Isles conference (Heslop Harrison Jnr 1953) was seen as a direct attack on his father's earlier work (S. M. Walters, pers comm. 2003), whereas in an earlier paper on Hebridean phytogeography he conspicuously ignores the remarkable Rum discoveries listed in Table 1 (Heslop Harrison Jnr 1948). Similarly, Heslop Harrison's son-in-law, W. A. Clarke, who accompanied him on many Hebridean expeditions, later withdrew his support from earlier "survival" theories (Clarke 1956).

Species that were likely to have been intentionally planted in semi-natural habitats include *Carex bicolor*, *C. capitata*, *C. glacialis*, *Epilobium lactiflorum*, *Erigeron uniflorus* and *Lychnis alpina*. We are less certain about the origin and status of *Juncus capitatus* and *Polycarpon tetraphyllum* but suspect that they were also intentionally introduced (or unintentionally with one or more of the above named species) and perhaps subsequently spread into semi-natural habitats (e.g. *Juncus capitatus* at 450 m in Coire Dubh). The presence of *Carex atrata*, *C. atrofusca*, *C. capillaris* and *C. norvegica* were never verified by independent botanists and were all recorded from atypical habitats. We have no direct proof of their introduction but in the absence of supporting evidence or herbarium specimens we consider their native presence on Rum to be extremely unlikely. In contrast, we suspect that *Filago gallica* was an unintentional introduction

<sup>3</sup>Similarly *Platanthera chlorantha* was recorded by Heslop Harrison (1951a) on Coll in 1947 and South Uist in 1949 but has never been recorded since on either island.

TABLE 3. INTRODUCED SPECIES RECORDED ON RUM BY J. W. HESLOP HARRISON BUT NOT RELIABLY RECORDED SINCE

	HH (1939b)	HH <i>et al.</i> (1945)	HH (1948a)	HH (1951a)	HH & Morton (1958)	HH (1951)	Details
1. Species associated with gardens, the policy woodlands and imported timber							
<i>Alchemilla xanthochlora</i>	+		+		+		Only in the Kinloch Woods (as <i>Alchemilla pratensis</i> ). An escape from the castle grounds (as <i>Astilbe japonica</i> ).
<i>Astilbe thunbergii</i>							Introduced with bamboos at Kinloch.
<i>Carex brunnea</i>	+	+					Planted at Papadil on the south coast.
<i>Crataegus laevigata</i>	+						Only recorded at Kinloch; probably introduced with imported top-soil.
<i>Equisetum telmateia</i>							Only recorded at Kinloch; probably introduced with imported top-soil.
<i>Fallopia japonica</i>							Planted at Kinloch.
<i>Inula glandulosa</i>	+						Only recorded at Kinloch; probably introduced with imported timber.
<i>Moehringia trinervia</i>							Planted.
<i>Picea abies</i>							Planted at Kinloch.
<i>Prunus domestica</i> subsp. <i>domestica</i>					+		Planted at Kinloch.
<i>Prunus domestica</i> subsp. <i>insititia</i>					+		Planted at Kinloch.
<i>Rosa caesia</i> subsp. <i>caesia</i>		+			+		As an escape from the castle grounds where it was used for hedging.
<i>Salix fragilis</i>	+						Planted at Kinloch.
<i>Sorbus aria</i>	+				+		Planted at Kinloch.
<i>Staphylea pinnata</i>							Presumably an escape from the castle grounds (Heslop Harrison 1954).
<i>Viola cornuta</i>					+		An escape from the castle grounds.
<i>Wahlenbergia gracilis</i> <sup>1</sup>					+		An escape from derelict greenhouses (Heslop Harrison 1951b).
2. Herbal and medicinal relics associated with dwellings							
<i>Artemisia absinthium</i>					+		Recorded as a relic ofcroft gardens.
<i>Carum carvi</i>					+		On the site of an old house at Kinloch.
<i>Inula helenium</i>	+				+		Only recorded from near old crofts.
<i>Mentha arvensis</i> x <i>spicata</i>	+				+		Only recorded as a garden outcast (as <i>Mentha genitilis</i> ).

TABLE 3. (CONTINUED)

Taxon	HH (1939b) <i>et al.</i> (1941)	HH (1945) (1948a)	HH (1951a)	HH & Morton (1958) (1951)	Details
3. Weeds associated with crops, livestock fodder (including food for red deer) and waste places					
<i>Anchusa arvensis</i>			+		Only recorded from fields near the sea (as <i>Lycopsis arvensis</i> ).
<i>Aphanes arvensis</i>	+				Scattered in waste places.
<i>Calystegia sepium</i>	+				Rare at Kinloch; possibly confused with <i>C. silvatica</i> .
<i>Chenopodium album</i>	+				Recorded as "not common" in waste areas.
<i>Chrysanthemum segetum</i>	+		+		Recorded from a field of oats near Kinloch.
<i>Conringia orientalis</i>					Recorded once at Kinloch (as <i>Erysimum orientale</i> ).
<i>Fallopia convolvulus</i>			+		Amongst corn at Kilmory.
<i>Festuca pratensis</i>	+				Meadow at Kinloch; probably introduced with imported hay.
<i>Galeopsis speciosa</i>	+		+		Frequent on arable land at Kinloch and Kilmory.
<i>Galeopsis tetrahit</i>	+				Common weed at Kinloch, possibly found in 2003 (leaves only).
<i>Geranium dissectum</i>	+				A weed of cultivated areas.
<i>Geranium pratense</i>	+	+			Only at Kinloch; probably introduced with imported seed or hay.
<i>Gnaphalium luteoalbum</i>	+	+			Only at Kinloch; probably introduced with imported seed or hay.
<i>Lamium amplexicaule</i>	+				Only at Kinloch.
<i>Lamium purpureum</i>	+	+			Scattered over the island, presumably in waste places.
<i>Lapsana communis</i>	+	+		+	Scattered over the island, presumably in waste places.
<i>Linum perenne</i>					Probably introduced with imported seed or hay.
<i>Malva neglecta</i>				+	Recorded as rare weed at Kinloch.
<i>Medicago lupulina</i>					By paths near Kinloch and Kilmory; possibly an adventive.
<i>Mentha arvensis</i>		+	+		A weed in fields at Kinloch and Kilmory.
<i>Phalaris canariensis</i>	+		+		Recorded as a casual on waste heaps.
<i>Sherardia arvensis</i>		+		+	Only at Kilmory; probably introduced with seed or hay.
<i>Urtica urens</i>					Only on waste ground at Kinloch.
<i>Veronica agrestis</i>	+			+	Scattered on cultivated ground.

<sup>1</sup> Probably best referable to *W. lobelioides* (see Preston 2004).

TABLE 4. NATIVE SPECIES RECORDED ON RUM BY J. W. HESLOP HARRISON WHICH HAVE NOT BEEN RELIABLY RECORDED SINCE 1957. ALL ARE CONCEIVABLE ON DISTRIBUTIONAL GROUNDS ALTHOUGH SOME (E.G. *HYPERICUM PERFORATUM*) ARE AT THE EXTREME EDGE OF THEIR RANGE IN THE HEBRIDES

Taxon	HH (1939b)	HH <i>et al.</i> (1941)	HH <i>et al.</i> (1942)	HH (1948a)	HH (1948b)	HH (1951a)	HH & HH (1951)	HH (1958)	Details
<i>Circaea lutetiana</i>									Only recorded from the Rudha na Roinne.
<i>Crepis capillaris</i>	+								Possibly overlooked as a native but recorded as a garden weed in 2003.
<i>Draba norvegica</i>						+			Probable error for <i>D. incana</i> .
<i>Elytrigia atherica</i>	+								Probable error for <i>E. juncea</i> or <i>E. repens</i> (var. <i>aristatum</i> ).
<i>Festuca filiformis</i>	+								Recorded (as <i>Festuca capillata</i> ) as rare and may still occur.
<i>Gnaphalium sylvaticum</i>	+								Only recorded from Glen Shellesder. An SNH record requires confirmation.
<i>Hypericum perforatum</i>									Only recorded near Kinloch. Possibly introduced.
<i>Linna minor</i>		+							Only known from pools near Harris. Disappeared after cattle were removed.
<i>Leontodon hispidus</i>	+								Rejected on distributional grounds. Suspected error for <i>L. saxatilis</i> .
<i>Oenanthe lachenalii</i>	+								Only recorded from pools near Harris. Disappeared after cattle were removed.
<i>Orobanchae alba</i>	+								Only recorded from the slopes of Bloodstone Hill. Probably overlooked.
<i>Pitularia globulifera</i> <sup>1</sup>									Only recorded from pools near Harris. Disappeared after cattle were removed.
<i>Platanthera chlorantha</i>						+	+		A brief colonist recorded in 1947 and 1948.
<i>Potamogeton alpinus</i>	+								Collected by K. B. Blackburn in the North Block but never seen again.
<i>Potamogeton coloratus</i>		+		+	+				Glen Shellesder: habitat unsuitable and suspected error for <i>P. polygonifolius</i> .
<i>Potamogeton filiformis</i>				+	+				Conceivable on distributional grounds but never refound.
<i>Potamogeton pectinatus</i>									Probable error for the aquatic form of <i>Juncus bulbosus</i> .
<i>Pyrola minor</i>	+								A single record from Hallival. Probably overlooked.
<i>Ruppia maritima</i>	+							+	Only recorded at Harris. Probably overlooked.
<i>Sanicula europaea</i>	+								Only one record. Probably overlooked.
<i>Scrophularia nodosa</i>						+			Only one record. Probably overlooked.
<i>Spergularia media</i>	+								A recent SNH record requires confirmation; could conceivably still occur.
<i>Stachys × ambigua</i>		+		+					Recorded in a few places. Possibly declining due to loss ofcrofting.
<i>Zostera marina</i>								+	Only recorded as cast-up specimens on the north coast.

<sup>1</sup> Re-introduced in the 1990s to pools near Harris (Magnusson 1997).

TABLE 5. NATIVE PLANTS RECORDED BY GRIEVE (1886) AND EGGELING (1965), NOT FOUND BY HESLOP HARRISON, AND NOT RECORDED RELIABLY SINCE 1965

	Grieve (1886)	Eggeling (1965)	Details
<i>Atriplex patula</i>	+		
<i>Cirsium heterophyllum</i>	+		Present on Eigg.
<i>Epilobium anagallidifolium</i>	+		Present on Skye.
<i>Epilobium obscurum x palustre</i>		+	
<i>Festuca ovina</i>	+		
<i>Galium boreale</i>	+		Present on Skye, Eigg and Canna.
<i>Galium uliginosum</i>	+		Present on Coll and Tiree.
<i>Gnaphalium supinum</i>	+		Present on Skye.
<i>Hymenophyllum tumbrigenae</i>		+	No recent records despite Page (1983).
<i>Lamium confertum</i>		+	
<i>Lucula spicata</i>	+		Rejected on distributional grounds.
<i>Myosotis sylvatica</i>	+		
<i>Papaver dubium</i> subsp. <i>dubium</i>		+	Possibly former crop weed.
<i>Poa compressa</i>		+	
<i>Populus alba</i>	+		
<i>Potentilla crantzii</i>	+		Present on Skye.
<i>Ranunculus sardous</i>	+		Rejected on distributional grounds.
<i>Rumex maritimus</i>	+		Present on Canna; overlooked?
<i>Scilla verna</i>	+		
<i>Silene latifolia</i>	+		
<i>Trifolium arvense</i>			Former crop weed?
<i>Tripleurospermum inodorum</i>		+	Former crop weed?

TABLE 6. SUMMARY OF TAXA RECORDED ON RUM BY J. W. HESLOP HARRISON BUT NOT RELIABLY RECORDED SINCE 1957

	Taxa recorded as native			Species recorded as introduction			Total
	Species	Subsp.	Hybrids	BI native	Archaeophytes	Neophytes	
Dubious	10	-	-	2	1	-	13
Critical	16	9	5	-	-	-	30
Introduction	-	-	-	19	15	12	46
Extinct native	23	-	1	-	-	-	24
Total	49	9	6	21	16	12	113

which established from imported seed or hay.

A detailed discussion of the reasons for the introduction of these species is beyond the scope of this paper; however, we suspect that his primary motive was scientific. In a series of phytogeographical papers Heslop Harrison discussed the possibility that many of the Arctic and alpine species in the Hebrides survived the height of the last ice age in ice-free refugia along the western seaboard (Heslop Harrison 1939a, 1941a, 1948c). At that time this glacial (or periglacial) "survival theory" was gaining widespread support as an explanation for the disjunct distributions of many Arctic plants in the Northern Hemisphere (e.g. Dahl 1946). The discovery of five amphiatlantic species in northwest Scotland was therefore viewed by Heslop Harrison as "weighty evidence" for the existence of "scattered nunataks" where "most of the arctic and alpine plants, exemplified by the sedges *Carex capitata*, *C. bicolor* and *C. glacialis*, the woodrush, *Luzula spicata*, the grass *Poa alpina*, the Arctic Scurvy Grass (*Cochlearia arctica*), the Fleabane (*Erigeron uniflorus*), the Alpine Saw-wort (*Saussurea alpina*) and the Norwegian Sandwort (*Arenaria norvegica*)...survived the rigours of the ice age" (Heslop Harrison 1948c). Whatever the truth over the origin of these species, the hypothesis of glacial survival has now largely been rejected (Halliday 2002). Although the possibility of survival in a few ice-free areas cannot be ruled out, the results of recent evolutionary and palaeobotanical research suggest that post-glacial immigration followed by retraction into climatic and edaphic refugia is a much more plausible explanation for the disjunct distributions of many Arctic species (Pigott & Walters 1954; Nordal 1987; Birks 1993).

#### CONCLUSION

There is no doubt that Heslop Harrison made many valuable discoveries on Rum. Some of his most notable discoveries have been substantiated with the passage of time (e.g. *Arenaria norvegica*, *Thlaspi caerulescens*), whereas his work on *Dactylorhiza*, *Euphrasia* and *Rosa* has added greatly to our understanding of the critical flora of the Hebrides. Plausible reasons can be advanced for the disappearance of many of his species which have not been refound since the 1950s (e.g. taxonomic advances, decline in the recording of critical species, land use change). However, the controversy surrounding the Rum "discoveries" has inevitably led some workers to treat all his records with suspicion. We hope the findings presented in this paper illustrate the enduring importance of his work which "remains a major contribution which cannot be ignored by any serious student of the Outer Hebridean flora" (Pankhurst & Mullin 1991), a sentiment that one of us (DAP) found to be true whilst working on the flora of Tiree and Coll (Pearman & Preston 2000).

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## REFERENCES

- BALL, M. E. (1974). Floristic changes on grasslands and heaths on the Isle of Rhum after a reduction or exclusion of deer grazing. *Environmental Management* **2**: 299–318.
- BALL, M. E. (1983). Native woodlands of the Inner Hebrides. *Proceedings of the Royal Society of Edinburgh* **83B**: 319–339.
- BALL, M. E. (1987). Checklists. Plants, in CLUTTON-BROCK, T. H. & BALL, M. E., eds *Rhum. The natural history of an island*, pp. 126–142. Edinburgh University Press, Edinburgh.
- BATES, M. A., GRAY, D. D. & HUTCHEON, K. (2002). *NVC vegetation survey and habitat impact assessment: Rum pSAC*. Scottish Natural Heritage (SNH) Commissioned Report F98AC317.
- BIRKS, H. J. B. (1993). Is the hypothesis of survival on glacial nunataks necessary to explain the present-day distributions of Norwegian mountain plants? *Phytocoenologia* **23**: 399–426.
- BIRSE, E. L. (1982). Plant communities on serpentine in Scotland. *Vegetatio* **49**: 141–162.
- CLAPHAM, A. R., TUTIN, T. G. & WARBURG, E. F. (1962). *Flora of the British Isles*. Second Edition. Cambridge University Press, Cambridge.
- CLAPHAM, A. R., TUTIN, T. G. & MOORE, D. M. (1987). *Flora of the British Isles*. Third Edition. Cambridge University Press, Cambridge.
- CLARK, W. A. (1939). The occurrence of *Arenaria norvegica* Gunn. and *Thlaspi alpestre* Linn. on Rhum (v.c. 104) and *Carex halleri* Gunn. on North Uist. *Journal of Botany* **77**: 4–5.
- CLARK, W. A. (1956). Plant distribution in the Western Isles. *Proceedings of the Linnean Society* **167**: 96–103.
- CLUTTON-BROCK, T. H. & BALL, M. E. eds. (1987). *Rhum. The natural history of an island*. Edinburgh University Press, Edinburgh.
- CLUTTON-BROCK, T. H. & GUINNESS, F. E. (1987). Red deer, in CLUTTON-BROCK, T. H. & BALL, M. E., eds *Rhum. The natural history of an island*, pp. 95–109. Edinburgh University Press, Edinburgh.
- CURRIE, A. & MURRAY, C. W. (1983). Flora and vegetation of the Inner Hebrides. *Proceedings of the Royal Society of Edinburgh* **83B**: 293–318.
- DAHL, E. (1946). On different types of unglaciated areas during ice ages and their significance to phytogeography. *New Phytologist* **45**: 225–242.
- EGGELING, W. J. (1964). A nature reserve management plan for the Island of Rhum, Inner Hebrides. *Journal of Applied Ecology* **1**: 404–419.
- EGGELING, W. J. (1965). Checklist of the plants of Rhum, Inner Hebrides (v.c. 104, N. Ebudes). Part 1. Stoneworts, ferns and flowering plants. *Transactions of the Botanical Society of Edinburgh* **40**: 20–59.
- EMELEUS, C. H. (1987). The Rhum volcano, in CLUTTON-BROCK, T. H. & BALL, M. E., eds *Rhum. The natural history of an island*, pp. 11–26. Edinburgh University Press, Edinburgh.
- FARMER, A. M. (1984). Aquatic angiosperm communities from lochs on Rhum. *Transactions of the Botanical Society of Edinburgh* **44**: 229–236.
- FERREIRA, R. E. C. (1970). *Vegetation map of the Isle of Rhum*. The Nature Conservancy, London.
- FERREIRA, R. E. C. & WORMELL, P. (1971). Fertiliser response of vegetation of ultrabasic terraces on Rhum. *Transactions of the Botanical Society of Edinburgh* **41**: 149–154.
- GRIEVE, S. (1886). Notes on the flora of the Island of Rhum, one of the Hebrides. *Transactions of the Botanical Society of Edinburgh* **16**: 487–490.
- HALLIDAY, G. (2002). Presidential address. The British flora in the Arctic. *Watsonia* **24**: 133–144.
- HESLOP HARRISON, J. JNR (1948). Recent researches on the flora and fauna of the western Isles of Scotland and their biogeographical significance. *Proceedings and Reports of the Belfast Natural History and Philosophical Society* **3**: 87–96.
- HESLOP HARRISON, J. JNR (1953). The north American and Lusitanian elements in the flora of the British Isles, in LOUSLEY, J. E., ed. *The changing flora of Britain*, pp. 105–123. T. Buncle & Co., Arbroath.
- HESLOP HARRISON, J. W. (1939a). Fauna and flora of the Inner and Outer Hebrides. King's College (University of Durham) Biological Expeditions. *Nature* **143**: 1004–1007.
- HESLOP HARRISON, J. W., ed. (1939b). The flora of the islands of Rhum, Eigg, Canna, Sanday, Muck, Eilean nan Each, Hyskeir, Soay and Pabbay. *Proceedings of the University of Durham Philosophical Society* **10**: 87–123.
- HESLOP HARRISON, J. W., ed. (1941a). Flora and fauna of the Inner and Outer Hebrides. *Nature* **147**: 134–136.

- HESLOP HARRISON, J. W. (1941b). *Carex bicolor* All., a sedge new to the British Isles in the Isle of Rhum. *Journal of Botany* **79**: 111–113.
- HESLOP HARRISON, J. W. (1944a). Rare British plants. *The Vasculum* **29**: 9–10.
- HESLOP HARRISON, J. W. (1944b). Notes and records. *The Vasculum* **29**: 14–16.
- HESLOP HARRISON, J. W. (1945). Noteworthy sedges of the Inner and Outer Hebrides. *Transactions of the Botanical Society of Edinburgh* **34**: 270–277.
- HESLOP HARRISON, J. W. (1948a). Introduced vascular plants in the Scottish Western Isles. *The North Western Naturalist* **23**: 132–135.
- HESLOP HARRISON, J. W. (1948b). Potamogetons in the Scottish Western Isles. *Transactions of the Botanical Society of Edinburgh* **35**: 1–25.
- HESLOP HARRISON, J. W. (1948c). The passing of the Ice Age and its effect on the plant and animal life of the Scottish Western Isles, in Fisher, J., ed. *The New Naturalist: a Journal of British Natural History*, pp. 83–90. Collins, London.
- HESLOP HARRISON, J. W. (1949). Field studies of *Orchis* L. I. The structure of Dactylorhynchid populations on certain islands in the Inner and Outer Hebrides. *Transactions of the Botanical Society of Edinburgh* **35**: 26–66.
- HESLOP HARRISON, J. W. (1951a). Further observations on the vascular plants of the Outer and Inner Hebrides. *Transactions of the Botanical Society of Edinburgh* **35**: 415–426.
- HESLOP HARRISON, J. W. (1951b). Alien and relict plants in the Isle of Rhum. *Occasional notes [from the Department of Botany, King's College, Newcastle-upon-Tyne, 2]* **6**: 1–4.
- HESLOP HARRISON, J. W. (1951c). An abstract – with embellishments. *Occasional notes [from the Department of Botany, King's College, Newcastle-upon-Tyne, 2]* **6**: 4–5.
- HESLOP HARRISON, J. W. (1951d). Need collectors be hooligans? *The Vasculum* **36**: 17–18.
- HESLOP HARRISON, J. W. (1954). Botanical investigations in the Isles of Lewis, Harris, Tarransay, Coppel and Shillay in 1953. *Proceedings of the University of Durham Philosophical Society* **11**: 135–142.
- HESLOP HARRISON, J. W. (1958). Botanical investigations in the Isles of Lewis, Harris and Great Bernera (v.-c. 110) and in the Isle of Rhum (v.-c. 104) in 1957. *Proceedings of the University of Durham Philosophical Society* **13**: 80–88.
- HESLOP HARRISON, J. W. & BOLTON, E. (1938). The rose flora of the Inner and Outer Hebrides and of other Scottish Islands. *Transactions of the Botanical Society of Edinburgh* **32**: 424–431.
- HESLOP HARRISON, J. W. & MORTON, J. K. (1951). Botanical investigations in the Isles of Raasay, Rhum (v.-c. 104) Lewis and Harris (v.-c. 110) in 1951. *Proceedings of the University of Durham Philosophical Society* **11**: 12–23.
- HESLOP HARRISON, J. W. CLARK, W. A., COOKE, R. B. & HESLOP HARRISON, H. (1941). Further observations on the flora of the Isle of Rhum. *Journal of Botany* **79**: 113–116.
- HESLOP HARRISON, J. W., HESLOP HARRISON, H., CLARK, W. A. & COOKE, R. B. (1942). Vascular plants from the Isle of Rhum (v.-c.104) and the Isle of South Uist (v.-c. 110). *Journal of Botany* **80**: 113–116.
- HULTÉN, E. & FRIES, M. (1986). *Atlas of north European vascular plants north of the Tropic of Cancer*. 3 volumes. Koeltz Scientific Books, Königstein.
- JERMY, A. C., CHATER, A. O. & DAVID, R. W. (1982). *Sedges of the British Isles*. Second edition. Botanical Society of the British Isles Handbook No. 1. B.S.B.I., London.
- LIGHTFOOT, J. (1778). *Flora Scotica*. 2 volumes. London.
- LODER, N. (2000). Culling plans put future of red deer study in jeopardy. *Nature* **404**: 5–6.
- LOONEY, J. H. H. & PROCTOR, J. (1989). The vegetation of ultrabasic soils on the Isle of Rhum. I. Physical environment, plant associations and soil chemistry. *Transactions of the Botanical Society of Edinburgh* **45**: 335–350.
- LÖVE, Á. (1983). *Flora of Iceland*. Almenna Bókafélagid, Reykjavík.
- LOVE, J. A. (1987). Rhum's human history, in CLUTTON-BROCK, T. H. & BALL, M. E., eds *Rhum. The natural history of an island*, pp. 27–42. Edinburgh University Press, Edinburgh.
- MAGNUSSON, M. (1997). *Rum: nature's island*. Luath Press, Edinburgh.
- NORDAL, I. (1987). Tabula rasa after all? Botanical evidence for ice-free refugia in Scandinavia reviewed. *Journal of Biogeography* **14**: 377–388.
- PAGE, C. N. (1986). *A survey of the pteridophytes of the Isle of Rhum*. Unpublished report to the Nature Conservancy Council.
- PANKHURST, R. J. & MULLIN, J. M. (1991). *Flora of the Outer Hebrides*. Natural History Museum, London.
- PERRING, F. H. & WALTERS, S. M., eds (1962). *Atlas of the British flora*. Thomas Nelson & Sons, London.
- PEARMAN, D. A. & PRESTON, C. D. (2000). *A Flora of Tiree, Gunna and Coll*. Privately published, Dorchester.
- PIGOTT, C. D. & WALTERS, S. M. (1954). On the interpretation of the discontinuous distributions shown by certain British species of open habitats. *Journal of Ecology* **42**: 95–116.
- POLUNIN, N. (1941). Stray notes on *Carex bicolor* All., latest addition to the British flora. *Journal of Botany* **79**: 158–160.

- POLUNIN, N. (1953a). Arctic plants not yet found in the British Isles. *Watsonia* **3**: 34–35.
- POLUNIN, N. (1953b). Vascular plants common to the Arctic and the British Isles: enumeration of the species. *Watsonia* **3**: 92–110.
- PRESTON, C. D., ed. (2004). John Raven's report on his visit to the Hebrides, 1948. *Watsonia* **25**: 17–44.
- PRESTON, C. D., PEARMAN, D. A. & WALKER, K. J. (2000). *Survey of the standing waters of Rum, July 2000*. Unpublished report to SNH (RB 515).
- PRESTON, C. D., PEARMAN, D. A. & DINES, T. D., eds (2002). *New atlas of the British & Irish Flora*. Oxford University Press, Oxford.
- PROCTOR, J. (1997). Recent work on the ultramafic vegetation of Scotland. *Botanical Journal of Scotland* **49**: 277–285.
- PUGSLEY, H. W. (1941). *Carex bicolor* All. in Scotland. *Journal of Botany* **79**: 172–173.
- PUGSLEY, H. W. (1945). Eyebrights of Rhum. *The Naturalist* **813**: 41–44.
- PUGSLEY, H. W. (1946). Eyebrights of Rhum. *The Naturalist* **816**: 11.
- RAGG, J. M. & BALL, M. E. (1964). Soils of the ultrabasic rocks of the Island of Rhum. *Journal of Soil Science* **15**: 124–133.
- RAVEN, J. E. (1948). Report by J. E. Raven on his botanical researches in the Hebrides. Unpublished report to the Council of Trinity College, Cambridge.
- RAVEN, J. E. (1949). Alien plant introductions on the Isle of Rhum. *Nature* **163**: 104–105.
- RICH, T. C. G. (1992). *Crucifers of Great Britain and Ireland*. Botanical Society of the British Isles Handbook No. 6. B.S.B.I., London.
- SABBAGH, K. (1999a). *A Rum affair*. Allen Lane The Penguin Press, London.
- SABBAGH, K. (1999b). Rum's the word. *New Scientist* (August): 44–47.
- STACE, C. A. (1997). *New Flora of the British Isles*. Second edition. Cambridge University Press, Cambridge.
- SCOTTISH NATURAL HERITAGE (SNH) (2000). *Rum NNR: update on progress with reserve management, community development and Kinloch Castle*. SNH Board Paper SNH/00/5/6 (available at <http://www.snh.org.uk/about/docs/item11.doc>).
- TUTIN, T. G., HEYWOOD, V. H., BURGESS, N. A. *et al.* eds (1964–1980). *Flora Europaea*. 5 volumes. Cambridge University Press, Cambridge.
- VIRTANEN, R., EDWARDS, G. R. & CRAWLEY, M. J. (2002). Red deer management and the vegetation of the Isle of Rum. *Journal of Applied Ecology* **39**: 572–583.
- WIGGINTON, M. J. Ed. (1999). *British Red Data Books. Volume 1. Vascular plants*. Third edition. Joint Nature Conservancy Council, Peterborough.
- WOOD, B. (2000). Room for nature? Conservation management of the Isle of Rum, UK and prospects for large protected areas in Europe. *Biological Conservation* **94**: 93–105.
- WORMELL, P. (1968). Establishing woodland on the isle of Rum. *Journal of the Royal Scottish Forestry Society* **22**: 207–220.
- YOUNG, D. P. (1950). Abstracts from literature. *Watsonia* **1**: 394.

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