BRITISH RUST FUNGI: ADDITIONS AND CORRECTIONS

D. M. HENDERSON & A. P. BENNELL

ABSTRACT. Changes that have occurred in the British rust flora, since the publication of Wilson and Henderson's *British Rust Fungi* in 1966, are documented. Apart from nomenclatural changes, an additional four native or naturalised species, six casually introduced species, 17 native or naturalised host plants, and 20 cultivated hosts, are reported, together with many additional records of the rarer species.

Since the publication of *British Rust Fungi* (Wilson and Henderson, 1966), there have been many additions to the rust flora: four native or naturalised species, six casually introduced species, 17 new native or naturalised host plants, and 20 new cultivated hosts. The purpose of this paper is to document these additions, and to include additional records of the rarer species. Nomenclatural changes suggested since 1966 are also discussed.

Each entry is cross-referenced to the 1966 work, the page being given in square brackets, and where new records have already been published the source is indicated. Descriptions are given for the additional rust taxa to aid identification, but where spore stages have not yet been recorded in Britain this information is given in square brackets. Some excellent accounts of selected Uredinales have appeared in the *Descriptions of Pathogenic Fungi and Bacteria* (Commonwealth Mycological Institute, 1964 onwards), and it seems proper to collect and include reference to these (cited as CMI No.), and also to the *CMI Distribution maps of plant diseases* (cited as Map No.), where relevant. The opportunity has been taken not only to correct certain errors, but also to note some references to *A Monograph of the British Uredineae and Ustilagineae* (Plowright, 1889), which were unfortunately omitted in 1966. A number of changes in author citation have become necessary and are recorded here. Many problems in this context have been solved by the work of Laundon (1967 & 74). A general index to rust and host taxa is included (p. 498).

A great debt is due to the many correspondents who have sent records and material for examination. The unpublished monthly summaries of plant diseases from the Plant Pathology Laboratory, Harpenden (contracted to Plant Path. Lab.) have been an invaluable source of information, as has Baker's (1972) summary of diseases in England and Wales.

Coleosporium tussilaginis (Pers.) Berk., Outlines of Brit. Fung. 333 (1860). [3]

This is the citation advocated by Laundon (1967), who also suggests as correct the following, regarded by us as synonyms.

C. campanulae Cooke, Microfungi 213 (1865).

C. petasites Cooke, Microfungi 213 (1865).

C. rhinanthacearum Kickx, Fl. Flandres 2:53 (1867).

C. sonchi (Str.) Tul., Ann. Sci. Nat. Bot. IV, 2:190 (1854).

The reference to *Euryops evansii* should be referred to *Euryops acraeus*. *Petromarula pinnata* is a new cultivated host (Brooks, 1972).

It should be noted that Saho (1966) has shown that rusts slightly different in uredospore morphology are connected with aecidial stages on five-needled pines in Japan. These could be troublesome if introduced into Britain.

Ochropsora ariae (Fuck.) Ramsb. [11]

Uredospores and teleutospores of this rust seem to occur almost exclusively on plants of *Sorbus aucuparia* less than 30 cm tall. The diplont stage was collected again on Deeside, at Dinnet, 1965, *Henderson* (E).

Milesia magnusiana (Jaap) Faull, Contr. Arnold Arboret. 2:32–33 (1932); Gäumann, p.25 (1959).

A new rust in Britain on *Asplenium adiantum-nigrum*.

Spermogonia and *Aecidia* unknown. *Uredosori* hypophyllous, scattered or grouped loosely on greenish-brown areas, pustular, 0·1–0·4 mm diam., covered by yellowing epidermis which eventually ruptures at a central stoma pore; peridium colourless, hemispheric, delicate, peridial cells irregularly polygonal or isodiametric, to somewhat elongate in the upper part, 10–16 μm across, with walls less than 1 μm thick; uredospores colourless, on short pedicels, obovoid or ellipsoid occasionally clavate or globose, 26–45 × 17–26 μm, averaging 34 × 20 μm; spore wall hyaline 0·5–1·5 μm thick with regular or irregularly scattered echinulations. *Teleutosori* wanting. Fig. 1A.

This rust was first collected in Eire at Dingle, 1964, *Leuze & Doppelbaur*. There are two further records from Eire: Bandon, Cork, 1975, *O'Brien* (E), and Glanmire, Cork, v 1978, *Scannell* (E). It is listed here under the generic name of *Milesia*, the correct name for imperfect rusts, for which teleutosori have not been described.

Milesina blechni Syd. [18]

Plowright, p. 271 (1889), cited under *Aecidium pseudo-columnare* J. Kühn two other hosts of spermogonial and aecidial stages—*Abies pectinata* and *Abies amabilis*, which were omitted in 1966.

M. kriegeriana (Magn.) Magn. [21]

New host: *Dryopteris pseudomas*, collected on the Lizard, Cornwall, 1970 by *Hudson*.

M. vogesiaca Syd. [23]

New host: *Polystichum aculeatum*—collected by *Henderson* at Gifford, Midlothian, Scotland, 1966 (E), and by *O'Connor* from Glenade, Co. Leitrim, 1939 (DBN). Several more records on *Polystichum setiferum* have come to light from Eire, at Wexford, Wicklow, and Galway—all collections of *O'Connor* (DBN).

M. whitei (Faull) Hirats. [24]

Further collections of this rare rust on *Polystichum setiferum*, were made at Blaise Castle, Bristol, 1955 by *Henderson* (E), and at Puckane, Co. Tipperary, 1933, by *O'Connor* (DBN).

Hyalopsora adianti-capilli-veneris Syd. [29]

Two additional records of this rare rust on *Adiantum capillus-veneris* in Britain were made in 1976, from Benley, Kent and on imported plants in Greater London (Plant Path. Lab.).

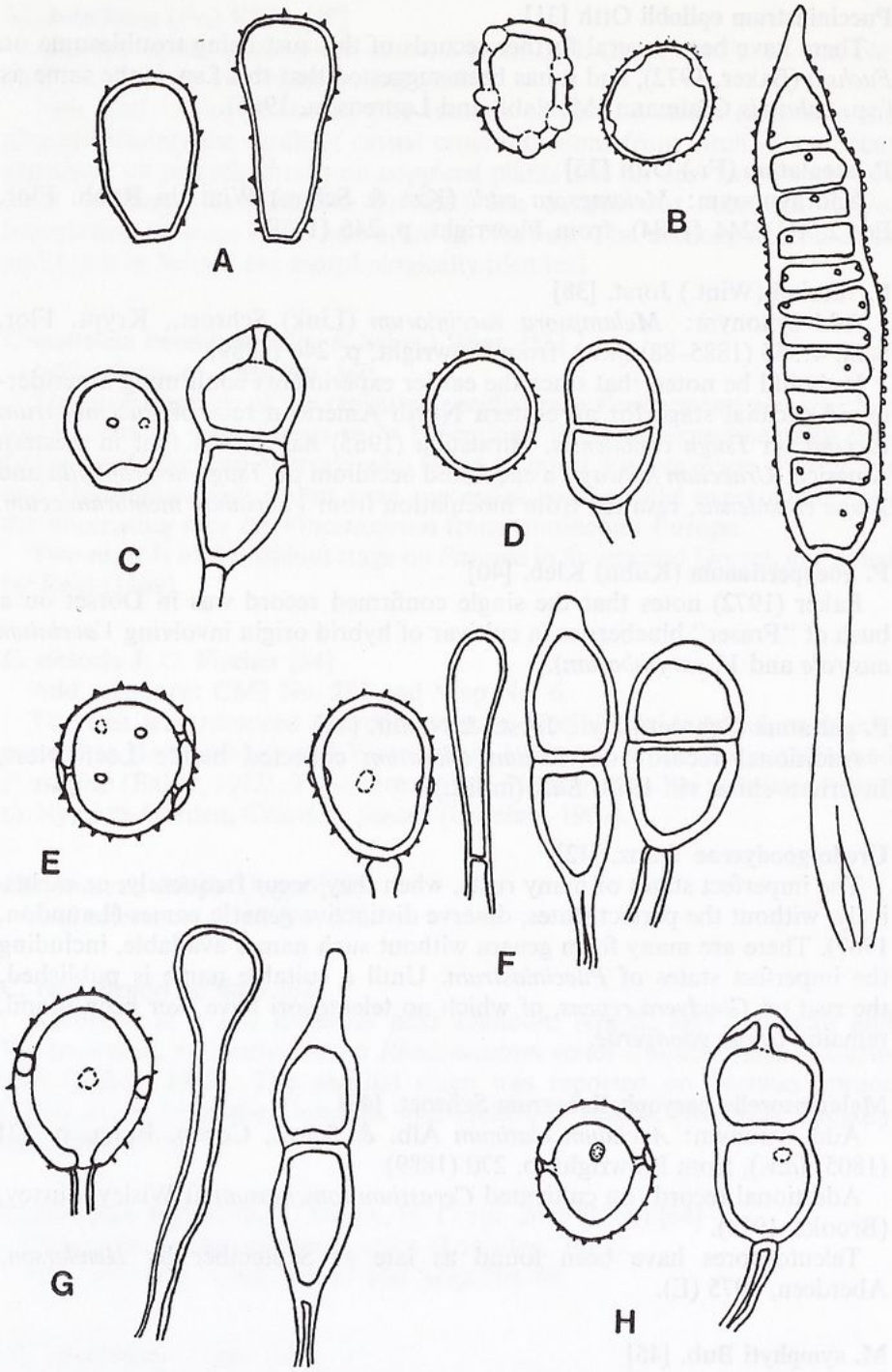

FIG. 1. A, *Milesia magnusiana*, uredospores; B, *Phragmidium fusiforme*, aecidiospore, uredospore and teleutospore; C, *Puccinia pelargonii-zonalis*, uredospore and teleutospore; D, *Puccinia oxalidis*, uredospore and teleutospore; E, *Puccinia porri*, uredospore; F, *Puccinia kusanoi*, uredospore, uredoparaphysis and teleutospores; G, *Puccinia longicornis*, uredospore, uredoparaphysis and teleutospore; H, *Puccinia nemoralis*, uredospore and teleutospore. F, G, after Reid (1978); B, H, after Gäumann (1959). (All × 660).

Pucciniastrum epilobii Otth [31]

There have been several further records of this rust being troublesome on *Fuchsia* (Baker, 1972), and it has been suggested that this f.sp. is the same as f.sp. *palustris* Gäumann (McNabb and Laurenson, 1965).

P. areolatum (Fr.) Otth [35]

Add synonym: *Melampsora padi* (Kze & Schm.) Wint. in Rabh. Flor. Ed. 2, 1(1):244 (1884), from Plowright, p. 246 (1889).

P. vaccinii (Wint.) Jørst. [38]

Add synonym: *Melampsora vacciniorum* (Link) Schroet., Krypt. Flor. Schl. 4:365 (1885–88) (*n.v.*), from Plowright, p. 246 (1889).

It should be noted that since the earlier experiments confirming a peridermioid aecidial stage for an eastern North American race of *Pucciniastrum vaccinii* on *Tsuga canadensis*, Hiratsuka (1965) has shown that in western America, *Uraecium holwayi*, a caeomoid aecidium on *Tsuga heterophylla* and *Tsuga canadensis*, resulted from inoculation from *Vaccinium membranaceum*.

P. goeppertianum (Kühn) Kleb. [40]

Baker (1972) notes that the single confirmed record was in Dorset on a bush of "Fraser" blueberries (a cultivar of hybrid origin involving *Vaccinium australe* and *V. corymbosum*).

P. guttatum (Schroet.) Hyl., Jørst. & Nannf. [41]

Additional record: on *Galium odoratum* collected beside Loch Ness, Inverness-shire, viii 1978, *Ellis* (in litt.).

Uredo goodyerae Tranz. [42]

The imperfect states of many rusts, when they occur frequently, or exclusively, without the perfect states, deserve distinctive generic names (Laundon, 1967). There are many form genera without such names available, including the imperfect states of *Pucciniastrum*. Until a suitable name is published, the rust on *Goodyera repens*, of which no teleutosori have ever been found, remains *Uredo goodyerae*.

Melampsorella caryophyllacearum Schroet. [43]

Add synonym: *Aecidium elatinum* Alb. & Schw., Consp. Fung. p. 121 (1805) (*n.v.*), from Plowright, p. 270 (1889).

Additional record: on cultivated *Cerastium tomentosum* at Wisley, Surrey, (Brooks, 1974).

Teleutospores have been found as late as September by *Henderson*, Aberdeen, 1975 (E).

M. symphyti Bub. [46]

Reported as severely affecting a crop of Comfrey (*Symphytum asperum*) in Oxfordshire (Baker, 1972).

Melampsoridium hiratsukanum Ito [47]

It seems doubtful if this rust is in Europe (see *Melampsoridium betulinum*).

M. betulinum (Fr.) Kleb. [49]

Add synonym: *Melampsora betulina* Desm., Pl. Crypt. de Fr. ed. alt. No. 1647 (*n.v.*), from Plowright, p. 243 (1889).

New host: *Alnus glutinosa*. The records of rust on *Alnus* in Britain are almost certainly the result of casual cross-infections from birch. They occur especially on juvenile shoots on coppiced plants and on one- or two-year old alder seedlings. Roll-Hansen (in litt.) has carried out successful cross-inoculation between birch and alder in Norway. The uredospores on alder and birch in Britain are morphologically identical.

Cronartium flaccidum (Alb. & Schw.) Wint. [51]

Add reference: CMI No. 580.

The independence of the repeating aecidial race *Peridermium pini* which is quite severe in some forests in N E Scotland has been experimentally confirmed by Miller and Murray, who failed to infect *Vincetoxicum*, *Pedicularis* and *Tropaeolum* with it, but were successful with parallel experiments with the alternating race on *Vincetoxicum* from continental Europe.

Two records of the diplont stage on *Paeonia* in Sussex and Dorset, are noted by Reid (1969).

C. ribicola J. C. Fischer [54]

Add reference: CMI No. 283 and Map No. 6.

The rust was recorded on redcurrant in Norfolk, widespread on blackcurrant in Herefordshire and Worcester in 1938, and on *Pinus ajacahuite* and *P. strobus* (Baker, 1972). The old record on *Pinus aristata* has now been traced to Nymans Garden, Crawley, Sussex (Comber, 1907).

Chrysomyxa abietis Unger [58]

Add reference: CMI No. 576.

C. rhododendri de Bary [62]

Recorded at a few localities near Dunoon, Argyll, also Cornwall and Westmorland, and seriously on *Rhododendron* series *Cinnabarinum* in Cornwall (Baker, 1972). The aecidial stage was reported on Norway spruce (*Picea abies*) from the Dumfries and Galloway region, (Redfern, Gregory and Low, 1975).

Melampsora lini (Ehrenb.) Desm., Pl. Crypt. 2049 (1850) [64]

This is the correct author citation (Laundon, 1967).

Add reference: CMI No. 51 and Map No. 68.

M. hypericorum Wint. [70]

Add new British host: *Hypericum* x *inodorum* "Elstead" = *H. elatum* (Brooks, 1972).

M. larici-populina Kleb. [73]

Add reference: CMI No. 479.

M. populnea (Pers.) Karst. [74]

Under **Mercurialis** [76] add synonym: *Caeoma mercurialis* Link in Linn. Species Plant. Ed. 4 (2):35 (1825), from Plowright, p. 260 (1889); and add reference: Map No. 389.

M. epitea Thüm. var. **epitea** [83]

Add new host: *Salix hibernica* on plants in cultivation at Newcastle, Co. Down, N Ireland, 1969, *Scannell* (E).

Under **Euonymus** [87] add synonym: *Caeoma euonymi* (Gmel.) Schroet., Abh. Schles. Ges. Vaterl. Cult. Nat. Abt. 1869–72:30 (1870), from Plowright p.260 (1889). Recorded on *Euonymus* sp. from Pembrokeshire in 1969 (Plant Path. Lab.)

Under **Larix** [88]: recorded on *Salix daphnoides* "Acutifolia" in 1977 (Plant Path. Lab.).

M. allii-fragilis Kleb. [92]

Add synonym: *Melampsora vitellinae* (DC.) Thüm., Hedwigia 18:79 (1879), from Plowright, p. 240 (1889).

Phragmidium bulbosum (Str.) Schlecht. [95]

Add reference: CMI No. 203.

P. rubi-idaei (DC.) Karst. [96]

Add reference: CMI No. 207.

The rarely recorded aecidia were noted throughout plantations of *Rubus idaeus* cv. "Glen Clova", and to a lesser extent cv. "Malling Jewel", at Croy, near Inverness, in vi 1977 (Gray, 1977). Collections have also been made at Tentsmuir, Fife, 1976, *Coppins* (E), and on the Dawyck Estate near Peebles, 1978, *Watling* (E).

P. violaceum (C. F. Schultz) Wint. [98]

Add reference: CMI No. 209.

P. sanguisorbae (DC.) Schroet. [102]

Add synonym: *Aecidium poterii* Cooke, Seeman Journ. Bot. 2:39 (1864), from Plowright, p. 268 (1889).

P. rosae-pimpinellifoliae Diet. [103]

Add reference: CMI No. 205.

P. mucronatum (Pers.) Schlecht. [104]

Add reference: CMI No. 204.

Howden and Jacobs (1973) claim that this rust is confined to *Rosa canina* and "*R. alba*", particularly "Laxa" stock. Within the limits of their survey which was chiefly of cultivated roses, this is probably true.

P. tuberculatum J. Müller [106]

Add reference: CMI No. 208.

This is the commonest rust of all bush roses.

P. fusiforme Schroet., Abh. Schles. Ges. Vaterl. Cult. Nat. Abt. 1869–72:24 (1870); Gäumann, p. 1194 (1959).

This species had been deleted from British Rust Floras since Plowright (1889), where it was recorded as *Phragmidium rosae-alpinae* on *Rosa alpina* (= *R. pendulina*). However, during an extensive survey of rose rusts it was recorded from two sites, apparently restricted to *R. rubrifolia* (Howden & Jacobs, 1973).

Spermogonia epiphyllous, rarely hypohyllous, subcuticular, up to 100 μm wide and 40 μm high. *Aecidia* caeomoid, large and rounded on the fruits, elongate on the pedicels and nerves, surrounded by clavate, occasionally capitate paraphyses, the latter up to 20 μm thick; aecidiospores rounded, polyhedral, in chains (often with rather long intercalary cells), 18–30 × 15–21 μm; wall colourless with large, scattered spines and several (8–9) conspicuously capped pores. *Uredosori* small, punctate, surrounded by inwardly-curved, thick-walled paraphyses, 50 μm long and 8–11 μm wide; uredospores almost globoid to elongate, 18–27 × 15–21 μm; wall thin, colourless with fine spines at approximately 1 μm spacings. *Teleutospores* in the same sori as uredospores, in relatively limited numbers of small black groups, (8–)10–12(–14)-celled, not constricted, cylindric or spindle-shaped, 42–114 × 21–31 μm, rounded at the base, apex extended into a horn-shaped or conical papilla, uppermost and lowermost cells larger, walls 4–5 μm coarsely verrucose with almost hyaline tubercules, 2–4 pores in each cell; pedicel 60–160 μm, colourless above, thickened and darker below. Fig. 1B, p. 477.

This species is easily distinguished from other rose rusts by the greater number of cells in its teleutospores, and the numerous obtrusive pores in its aecidiospores.

Kunkelia nitens (Schw.) Arth. [107]

Add reference: CMI No. 201, where the synonym *Gymnoconia nitens* (Schw.) Kern & Thurston is described.

Kuhneola uredinis (Link) Arth. [108]

Add reference: CMI No. 202.

Add record: on *Rubus* "Merton Thornless", from an Edinburgh garden.

Frommea obtusa (Str.) Arth. [110]

Correction: substitute "brachy-form" for "auteu-form".

Gymnosporangium clavariiforme (Pers.) DC. [116]

Add reference: CMI No. 542.

New host cultivar: *Juniperus communis* "Hibernica", found at East Grinstead, (Plant Path. Lab.).

G. confusum Plowr. [117]

Add reference: CMI No. 544 and Map No. 429.

G. sabinae [Dicks.] Wint., Hedwigia 19:55 (1880). [119]

This is the correct name for *G. fuscum* DC., as pointed out by Laundon (1975).

Add reference: CMI No. 545 and Map No. 387.

This rather uncommon rust was found in 1974 by *Davidson* (E) in an Edinburgh garden, on a plant of *Juniperus sabina* which had previously been acquired from a south of England nursery.

G. juniperi-virginianae Schw. [122]

Add reference: CMI No. 547 and Map No. 61.

Physiologic race specialisation has been recognised in this fungus from the work of Aldwinckle (1975). No further records are known from this country.

G. asiaticum [Miyabe ex] Yamada, Shokubutsu Byorigaku (Plant Pathology) Tokyo Hakubunkwan, M.37, 9:304–306 (1904); CMI No. 541.

The first record of this rust in Europe was made as *G. haraeanum* Syd. on bonsai *Juniperus chinensis* imported from Japan in 1974 (Plant Path. Lab.). Kern (1973) prefers *G. asiaticum* as the valid name for this rust.

[*Spermogonia* epiphyllous in groups 2·5 mm diam. *Aecidia* hypophyllous, on thickened brown spots, white, tubular, 3–6 mm long, tearing at tip to reveal rusty-brown spores; peridial cells elongate to rhomboid, verrucose, with warts 5–6 μm high; aecidiospores globose to broadly ellipsoid, often slightly angular, 17–25 μm diam.; wall yellow, finely and densely verrucose, 1·5–2·5 μm thick; pores 6–8 with slight thickenings.] *Teleutosori* in small groups on leaves and stems, without swellings, conical, reddish-brown (fresh) to dark chestnut (dry); teleutospores broadly to narrowly ellipsoid, 2-celled, slightly constricted, rounded at both ends, 32–47 × 15–25 μm; wall golden to cinnamon, 1–1·5 μm thick, 2 pores beside the septum in each cell. Fig. 1C, p. 477. [*Spermogonia* and *aecidia* on *Chaenomeles*, *Cydonia*, *Photinia* and *Pyrus*.] *Teleutosori* on *Juniperus chinensis*.

A full account of this species is provided by Tanaka (1922).

Puccinia fergussonii Berk. & Br. [126]

The record of *Puccinia asarina* Cooke, noted by Plowright, p. 202 (1889), results from a misidentification of the host, and should be assigned to this species, as indicated by Grove, p. 204 (1913).

P. arenariae (Schum.) Wint. [127]

Additional hosts: *Sagina x normanniana*, Glen Clova, *Watt* (E); *Sagina subulata*, Alderney, 1933, *Jackson* (K).

Several reports, including Baker (1972), indicate that this rust is frequently severe on Sweet William (*Dianthus barbatus*).

P. malvacearum Mont. [132]

Add reference: CMI No. 265.

New British host: *Althaea officinalis*. This plurivorous rust recurs annually on Marshmallow in cultivation at the Royal Botanic Garden, Edinburgh, probably as result of cross-infection from other members of the Malvaceae. As yet there are no records from the wild on this native host.

P. pelargonii-zonalis Doidge, Bothalia 2:98 (1926); CMI No. 266 and Map No. 412.

A new rust in Britain on *Pelargonium* x *hybridum*.

Spermogonia and *aecidia* unknown. *Uredosori* hypophyllous on small pale leaf spots 0·5–1·5 mm diam., scattered or closely crowded, with secondary sori often developing in irregular circles around the primary ones, cinnamon-brown, pulverulent, surrounded by torn epidermis; uredospores broadly ovate or sub-globose, yellow-brown, 21–29 × 19–22 μm; wall 1·5–2 μm thick, delicately echinulate, with 2 small conspicuous equatorial pores. *Teleutospores* relatively rare, mixed with the uredospores, ellipsoid or clavate, pale brown, upper cell darker, apex rounded, base rounded or attenuate, slightly constricted at the septum, 36–70 × 16–28 μm; wall 3 μm thick to 5 μm at the apex, thinner in the lower cell, germ pores apical in the upper cell, close to the septum in the lower; pedicel persistent, hyaline up to 40 μm long. Fig. 1C, p. 477.

This rust, a native of South Africa, and also known from New Zealand and Australia, appeared in Europe in mediterranean France in 1962. It spread rapidly northwards through Switzerland and Belgium, to be recorded in Britain for the first time at Eastbourne, Sussex, in July 1965. Subsequently it spread through southern counties reaching Yorkshire and Lancashire in 1968, some of this dispersal being encouraged by movement of nursery stocks. In October 1969 teleutospores were noted for the first time in Britain, from a West Sussex nursery. In the same year infected cuttings were reported from Durham and Cumbria, and in 1970 the first Scottish record was made at Peebles. The species is now known from Sweden and North America. Jørgensen (1969) believes that overwintering is achieved by both mycelium and active uredosori on host plants retained from season to season.

P. oxalidis (Lév.) Diet. & Ellis, Hedwigia 34:291 (1895).

This introduced species is new to the British flora. It first appeared on *Oxalis corymbosa* at Deal, Kent, in 1973, and was subsequently collected on the same host in Norfolk, 1974, by *Ellis* (E). It has also been recorded from Jersey and Guernsey on another introduced host, *Oxalis latifolia* (Brooks, 1974).

[*Spermogonia* epiphyllous, loosely gregarious in groups, 1–3 mm diam. *Aecidia* hypophyllous, crowded in groups, cornutiform, narrowing above to acute apex; peridium white, long closed; peridial cells square or rhombic, 18–23 × 20–26 μm, outer wall transversely striate, 9–12 μm thick, inner wall finely verrucose, 1·5–3 μm thick; aecidiospores angularly globoid or ellipsoid, 11–15 × 13–18 μm; wall colourless, 1–2 μm thick, closely and finely verrucose]. *Uredosori* hypophyllous, in orbicular or irregular groups, 2–5 mm across, often covering the whole surface, somewhat confluent, 300 μm diam., soon naked, pale yellowish white, at first waxy, becoming pulverulent, ruptured epidermis rather inconspicuous; uredospores globoid, 16–19 × 17–24 μm; wall very pale yellow, 0·8–1 μm, minutely echinulate, the pores uncertain. *Teleutosori* hypophyllous, very pale brownish-yellow, waxy; teleutospores ellipsoid or broadly oblong, 13–20 × 18–28 μm, rounded or obtuse at both ends, slightly or not constricted at septum; wall almost colourless, smooth, uniformly thin, 0·5–0·8 μm; pedicel colourless, thick, very short. Fig. 1D, p. 477.

[Spermogonia and aecidia on Berberidaceae (*Berberis* and *Mahonia*) in North America, where the rust is native]. Uredosori and teleutosori (both found on the Norfolk collection) on members of the genus *Oxalis* section *Ionoxalis*.

It should be noted that the uredosori and teleutosori of *Puccina sorghi* Schw. which also occur on species of *Oxalis*, are distinguished by larger, thicker-walled uredospores and longer, dark-coloured teleutospores, with a thickened apex, but this rust is probably confined to section *Corniculatae*.

P. argentata (C. F. Schultz) Wint. [134]

A succinct account of the confirmation of the aecidial state on *Adoxa* can be found in Laundon (1963).

P. saxifragae Schlecht. [138]

Additional record: on *Saxifraga granulata*, Edgehill, Warwickshire, 1972, *Clark* (E).

P. pazschkei Diet. [139]

Additional record: on *Saxifraga hostii*, Oxfordshire, 1970 (Plant Path. Lab.).

P. aegopodii Röhl. [144]
For corrected author citation see Laundon (1974).

P. apii Desm. [146]
Add reference: CMI No. 284.

P. hydrocotyles Cooke [151]
Additional record: on *Hydrocotyle vulgaris*, Isle of Ulva, Inverness-shire, 1968, *Henderson* (E).

P. smyrnii Biv.-Bernh. [157]
Ultrastructural investigation of the teleutospore and its development (Bennell, Henderson and Prentice, 1978) has revealed that its surface morphology has been misinterpreted under the light microscope, and it should properly be described as coarsely tuberculate.

P. acetosae Körnicke [159]
Additional record: on *Rumex acetosella* (on which it is rare), Montgomery, 1969, *Dennis* (E).

P. polygoni-amphibii Pers. var. **convolvuli** Arth. [165]
The aecidial stage, which is rare in Britain, was found by *D. A. & D. G. Reid* on *Geranium dissectum* at Burpham, Sussex in 1971 (E).

P. primulae Duby [167]
Schofield collected an infected plant resembling *P. veris* at Studland in 1966 (E). The host plant has been critically examined and is indistinguishable from *P. veris* although the possibility of some introgression with *P. vulgaris* cannot be entirely discounted.

P. vincae Berk. [168]
Additional records: on *Vinca major*, Kent, 1960, Guildford and Wisley, 1966, and also Cornwall and Hampshire, (Baker, 1972).

P. gentianae Röhl. [170]
Additional record: on *Gentiana acaulis* in Scotland (E).

P. antirrhini Diet. & Holw. [173]
Add reference: CMI No. 262 and Map No. 40.

P. clintonii Peck var. **sylvaticae** Savile, Can. J. Bot. 45:1097 (1967). [175]
Savile, after detailed examination of a wide range of *Pedicularis* rusts, placed all the British collections in this new endemic variety, but stressed that, because of the absence of resting teleutospores in several collections, identity could not be certain. He also noted that the rust of *Pedicularis palustris* might well differ from that on *P. sylvatica*.

P. veronicae-longifoliae Savile, Can. J. Bot. 46:635 (1968). [176]

Add synonym: *Puccinia veronicae* Schroet. f.sp. *spicatae* Gäum., Ann. Myc. 39:42 (1941).

The teleutospore collections on *Veronica spicata* in Britain were placed under *Puccinia veronicae* in 1966, but have since been separated by Savile.

P. menthae Pers. [179]

Add reference: CMI No. 7 and Map No. 211.

Add new British host: *Mentha* x *verticillata*, Stormont, Perthshire and Rossdhu, Dunbartonshire, 1959, *Henderson* (E).

P. thymi (Fuck.) Karst., Bidr. Känned Finl. Nat. Folk. 9:44 (1884). [180]

This is the correct author citation.

Key to **Puccinia** on Compositae [190]

Correction: (5.) *P. erechthites* should read *P. lagenophorae*.

P. calcitrapae DC. [191]

Add synonym: *P. carthami* Corda, Icones Fung. 4:15 (1840).

Cummins (1977) has re-examined the status of these rusts in the context of North American collections. The European material needs to be assessed in the light of his findings, but the synonymy of *P. carthami* is accepted. Under the latter name a good description exists in CMI No. 174, and the distribution is recorded in Map No. 424.

There are two new British hosts for the collective species *P. calcitrapae*: a record on *Centaurea calcitrapa*, Cuckmere Haven, Sussex, 1959, and a collection of abundant uredosori and sparse teleutosori on *Carthamus tinctorius*, Bush Estate, Midlothian, viii 1975, *Gilmore* (E), the host having been introduced as seed from California.

Additional record: on *Centaurea scabiosa*, Bredon, 1973, *Clark* (E).

P. chrysanthemi Roze [194]

Add reference: CMI No. 175 and Map No. 117.

Cummins (1977) considers this to be synonymous with *Puccinia tanaceti* DC., but the relevance of his decision (based on North American collections) to these rusts in Britain has yet to be determined.

P. glomerata Grev. [202]

Add synonym: *P. senecionis* Lib., Crypt. Ard. exsicc. No. 92 (*n.v.*), from Plowright, p. 209 (1889).

Additional record: on *Senecio aquaticus*, Warwickshire, 1972, *Henderson* (E).

P. helianthi Schw. [202]

Add reference: CMI No. 55 and Map. No. 195.

P. horiana P. Henn. [368]

Add reference: CMI No. 176 and Map No. 403.

The rapid spread of this rust was appraised by Baker (1972). Furlong (1977) notes that in 1976 over 300 outbreaks were reported and points out that, whereas *Chrysanthemum moriflorum*, *C. indicum*, *C. nipponicum*, *C. uliginosum*, *C. yeozoense* and *C. makinoi* are susceptible, *C. carinatum*, *C. coronarium*, *C. maximum*, *C. coccineum*, *C. cinerariifolium* and *C. leucanthemum* appear to be resistant.

P. lapsanae Fuck. [208]

Add synonym: *Aecidium barbareae* Cooke, (non DC.), Grevillea 10:115 (1882), from Plowright, p. 265 (1889).

Cummins (1977) has reduced this rust to a variety of its close relative *Puccinia variabilis*. However the distinct teleutospore size and the host range, restricted to *Lapsana communis*, are in favour of retaining specific status.

P. tanaceti DC. [212]

Add new British host: *Chrysanthemum coccineum* (Pyrethrum) from a Sussex garden, (E), as reported by Green and Brooks (1964); and on cultivar "Radiant", Somerset, 1972 (Plant Path. Lab.).

P. lagenophorae Cooke [213]

Corrected reference: Grevillea 13:6 (1884).

Add reference: Viennot-Bourgin, Rev. de Mycol. 29:241 (1964).

Add synonym: *Puccinia erechthitis* McAlp., Proc. Linn. Soc. N. S. Wales (2 Ser.) 10:34–36 (1895).

This rust has occurred on cultivated Cinerarias (*Senecio cruentus*) (Brooks, 1972), and has also been found as a natural infection on *Bellis perennis* at Bristol, 1972 (Plant Path. Lab.). Experimental inoculations have been successful on *Senecio lautus*, *S. vagus* and *S. vulgaris* var. *radiatus*. A new native host is *S. cambrensis*, of which infected populations were found at Llanfynydd, Wales, vi 1968, *McNeill* (E).

The spread of this introduced rust continues, with collections made in the Republic of Ireland, Co. Dublin, 1963, *P. D. O'Connor*, (E), and in Northern Ireland, Lisburn, 1965, *Henderson*, (E).

P. allii Rud. [217]

Savile (1961) considers the collections on *Allium schoenoprasum* (chives) and *A. porrum* (leek) to merit specific delimitation as *Puccinia mixta* and *P. porri* respectively. However the former intergrades strongly with *P. allii* and is retained here under that name, for which a good description exists as CMI No. 52, and the distribution is covered in Map No. 400. Aecidia of this species were recorded in Britain for the first time from Flotterstone, near Edinburgh, 1968, *Wallace* (E), and subsequently in a greenhouse in Shrewsbury in 1969 (Dale, 1970), both on *A. schoenoprasum*. The rust on leek is accepted as distinct and is treated under *P. porri*.

P. porri (Sow.) Wint. in Rabh. Krypt. Fl. Ed. 2,1(1):200 (1882); Gäumann p. 432 (1959). [217]

Uredosori only; uredospores 27–38 × 23·5–30 μm; wall pale yellow-brown, 1·5–3·0 μm thick with conspicuous echinulations at 1·5–2·5 μm spacing; pores 8–10 scattered, each with conspicuous hyaline "cap". Fig. 1E, p. 477. On *Allium porrum*.

This rust is distinguished from *P. allii* by virtue of its larger uredospores, with more prominent echinulations, and clearly capped pores; furthermore no teleutospores have ever been recorded in this country.

P. porri can cause quite severe disease on leeks, and its increased occurrence over the last decade can be attributed to a succession of mild winters facilitating the perennation of the rust (Dixon, 1976).

P. asparagi DC. [219]

Add reference: CMI No. 54 and Map No. 216.

P. prostii Duby [220]

New British host: *Tulipa australis*, a close relative of *T. sylvestris*, recorded at Harpenden, 1970, (Plant Path. Lab.) on material imported from Greece.

P. obscura Schroet. [223]

Three additional records have been made of the aecidial stage of this rust on *Bellis perennis*. More than 100 plants of nursery stock of cultivar "Rob Roy" were infected at Goffs Oak, Hertfordshire in 1972 (Plant Path. Lab.). In the wild, the rust appears to be native to machair (lime-rich, shell-sand, dune pastures of N & W Scotland) with records from Birsay, Orkney, 1975, *Angus*, and Barra, Outer Hebrides, v 1978, *Henderson* (E).

P. schroeteri Pass. [224]

The collection recorded in *Bull. Brit. Mycol. Soc.* 1(1):5 (1967) from the Malvern foray proves to be *Puccinia liliacearum*, probably on leaves of *Ornithogalum umbellatum* (E).

P. iridis Rabh. [226]

Add reference: CMI No. 285.

There is no further evidence that *I. pseudacorus* can serve as a host in Britain and several hosts have been redetermined as *I. foetidissima*. A collection of *Iris xiphium* cv. "Golden Harvester" from Great Hawksley, Essex, 1975, (Plant Path. Lab.) adds a new host species, which was also noted by Jørstad & Roll-Hansen (1949) for exsiccati of *I. xiphium*; only uredospores were present.

P. eriophori Thuem. [230]

Savile (1972) regards *P. eriophori-alpini* Allescher as the correct name for *P. confinis*, and separates that species from *P. eriophori* by small differences in uredospore size. It seems doubtful if they will still prove distinct when abundant material becomes available; all seem to form aecidia on *Solidago*. In these circumstances it seems best to retain the British collections under the earliest name, *P. eriophori*.

P. caricina DC. [232]

Add reference: Map No. 209.

Formation of aecidia on *Ribes sanguineum* is rare in Britain, being noted only on Mull and Skye; Brooks (1966) added a further record from Mallaig, Inverness-shire.

P. microsora Körnicke [245]

This rare rust was found for the second time in Britain on the Island of Mull in 1968 by *Henderson*, on *Carex vesicaria* (E).

P. kusanoi Diet., Bot. Jahrb. 27:568 (1899); Cummins, p. 269 (1971).

A new rust in Britain, identified by Reid from a herbarium specimen of *Arundinaria fastuosa*, dated 1961 (K). Reid (1978) published a comprehensive description of this bambusicolous species, which is native to Japan, China and Taiwan.

Spermogonia unknown. [*Aecidia* on *Deutzia* species, not known in Britain.] *Uredosori* hypophyllous, as inconspicuous pale cinnamon pustules, 250 μm diam.; uredospores 25–34 × 21·5–28 μm, ovate to globose; wall 2–3 μm thick, subhyaline to golden-brown, with short, acute echinulations and 4 equatorial germ pores; paraphyses clavate or subcapitate, 65 × 12 μm, thin-walled, sometimes septate near the base. *Teleutosori* hypophyllous, dark-brown, 500 μm diam., often covered with a whitish pulverulence of basidia and basidiospores; teleutospores 2-celled, brown, dimorphic (long, narrow, fusiform, 55–70 × 15–20 μm, with a strongly thickened conical apex; or short, obovate, 35–50 × 18–23 μm, with a thickened apex, conical or broadly rounded); germ pore of upper cell apical to sub-apical; pedicel elongate to 200 μm, thick-walled, colourless; mesospores, ovate to globose, 29–33 × 21–23 μm, with smooth, thickened brown walls, and a single germ pore, often abundant. Fig. 1F, p. 477.

Uredosori and teleutosori were found on the herbarium specimen, but visits to the source location, Wakehurst Place, Sussex, failed to reveal any living material.

P. longicornis Pat. & Hariot, Bull. Soc. Mycol. Fr. 7:143 (1891); Cummins, p. 138 (1971).

A new rust in Britain: on *Arundinaria* (*Pseudosasa*) *japonica*.

Spermogonia & *aecidia* unknown. *Uredosori* hypophyllous, pale cinnamon pustules, 250 μm diam.; uredospores ovate to globose, 30–36 × 26–31 μm; wall thick, subhyaline to pale brown, with short, acute spines and 3–4 equatorial germ pores; paraphyses clavate to capitate, 89 × 23 μm, thin-walled. *Teleutosori* hypophyllous, early-exposed, purplish to pale brown, 250 μm diam., covered by a whitish pulverulence of basidia and basidiospores, surrounded by a yellow halo; teleutospores 2-celled, brown, mostly fusoid, 36–61 × 14–20 μm; walls smooth or minutely verrucose, elongated into a rostrate apex of up to 34 μm; pedicel persistent, thick-walled, hyaline, to 165 μm. Fig. 1G, p. 477.

This second bambusicolous rust was discovered by Reid at Wakehurst Place, Sussex, vi 1977 (K), while searching for living material of *P. kusanoi*. In his description, Reid (1978) observes that the wide distribution of vegetatively propagated material of the hosts in Britain and Europe makes it likely that these bambusicolous rusts of Asian origin may occur elsewhere, and be currently overlooked.

P. brachypodii Otth [250]

Cummins and Greene (1966) proposed a rearrangement of the grass rusts in the "poae-nemoralis" group, recognising one species, *P. brachypodii*, with four varieties. Three of these varieties occur in Britain:

var. **brachypodii**

Uredosori and *teleutosori* on *Brachypodium*; distinguished by conspicuously seriate sori; uredospores 21–25 × 16–21 μm, paraphyses 40–70 μm long; teleutospores 30–38 × 17–23 μm.

Urban (1962) has experimentally confirmed the relation between some aecidia on *Berberis* and the rust on *Brachypodium*, in Czechslovakia.

var. **poae-nemoralis** (Otth) Cummins & Greene, Mycol. 58:705 (1966). [271]

Synonym: *Puccinia poae-nemoralis* Otth

Uredosori and *teleutosori* on *Poa*, *Anthoxanthum*, *Glyceria*, and *Puccinellia*; distinguished by non-seriate sori, and long teleutospores; uredospores 22–27 × 18–23 μm, paraphyses 50–80 μm; teleutospores 35–50 × 17–23 μm.

var. **arrhenatheri** (Kleb.) Cummins & Greene, Mycol. 58:709 (1966).

Uredosori and *teleutosori* on *Arrhenatherum*; distinguished by non-seriate sori, long brown uredospores, and long straight paraphyses; uredospores 26–33 × 21–26 μm, paraphyses up to 120 μm long; teleutospores 36–50 × 15–22 μm.

Add new host cultivar: on *A. elatius* var. *bulbosum* f. *variegatum*, East Grinstead, Sussex, v 1973 (Plant Path. Lab.); uredospores only.

P. coronata Corda [251]

Add new British host: *Glyceria maxima* (*G. aquatica*), Wheatfen, Norfolk, x 1971, *Ellis* (E).

Ellis (in litt.) reports close proximity of this and subsequent collections to *Rhamnus catharticus* bearing heavy aecidial infection, and has made aecidiospore inoculations of *Glyceria maxima* which gave rise to uredosori and subsequently teleutospores.

P. festucae Plowr. [258]

Add synonym: *Aecidium periclymeni* Schum., Enum. Plant. Saell. 2:225 (1803) (*n.v.*) from Plowright, p. 264 (1889).

P. graminis Pers. [259]

Urban (1966 & 69) has formally recognised some of the variation within *P. graminis* previously investigated in Britain by Batts. Urban distinguishes two subspecies:

subsp. **graminis**

This consists of two varieties, var. **graminis** on *Triticum*, *Elymus*, and *Aegilops* and var. **stakmanii** Guyot, Massen. & Saccas on *Agropyron*, *Avena*, *Elytrigia*, *Hordeum*, *Roegneria* and *Secale*. This subspecies is distinguished by its larger uredospores (26–40 × 16–22 μm).

subsp. **graminicola** Urban

This occurs predominantly on wild grasses, and has smaller uredospores (20–30 × 14–20 μm). Additional record: on *Deschampsia caespitosa*, Chaddesley Wood, Worcestershire, 1974, *Clark* (E).

Urban's treatment has been followed by Ullrich (1977) in his review of fodder and turf grass rust fungi in central Europe.

P. brunellarum-moliniae Cruchet, Zbl. Bakt. II 13:96 (1904). [268]

The *Molinia* rust with spermogonia and aecidia on *Prunella vulgaris*, cited under *P. moliniae* Tul. in Wilson & Henderson (1966) may be distinguished as *P. brunellarum-moliniae*, as pointed out by Ing (1978).

P. nemoralis Juel, Oefvers. Kgl. Svenska Vet. Akad. Forhandl. 51:503 (1894); Gäumann, p. 743 (1959).

This is a new rust in Britain, collected by Ing (1978) in the Coed National Nature Reserve, Merioneth, North Wales, vi & vii 1975 (E), and again in v 1976, *Noble* (E).

Spermogonia epiphyllous, subepidermal, spherical, 100 μm diam. *Aecidia* epiphyllous on rather large, swollen, red areas, flecked pale underneath; loosely grouped around the spermogonia; peridium cupulate, with recurved white margin, cells 20–25 × 15–17 μm, in distinct rows, outer walls smooth, 6–9 μm thick, overlapping, inner walls warted, 3–4 μm thick, not overlapping; aecidiospores in chains, rounded-oval to polyhedral, 13–21 × 10–14 μm; wall finely warted, colourless, 1 μm thick. *Uredosori* small, brown, 0·5 mm long, soon covered in teleutospores; uredospores spherical or ellipsoid, 21–27 × 18–26 μm, wall yellow-brown, 3–4 μm thick, with gross spines and 3 conspicuous capped pores. *Teleutosori* 0·5–3 mm long, often confluent, pulvinate black; teleutospores ellipsoid, rounded at both ends, 30–46 × 20–27 μm, faintly constricted; wall smooth, 3–4 μm thick, to 7 μm at the apex; pore apical in upper cell, superior in lower; pedicel colourless, persistent. Mesospores occasionally present. Fig. 1H, p. 477.

This is a member of the closely-related group of rusts which have diplont stages on *Molinia caerulea*. In *P. nemoralis* the spermogonia and aecidia occur on *Melampyrum pratense* in contrast to *P. brunellarum-moliniae*, which has these stages on *Prunella vulgaris*.

A second collection of this rust was made at East Rhidorroch, near Ullapool, Wester Ross, vii 1977, *Ing*, consisting only of spermogonia, in contrast to the Welsh locality from which all four stages were recorded. According to Gäumann (1959), *P. nemoralis* can be distinguished from *P. brunellarum-moliniae* in the telial stage, by virtue of having shorter teleutospores. Ing (1978), in his discussion of the status of these rusts, recommends that further records of *P. nemoralis* should be sought in damp woodlands, where *Molinia* and *Melampyrum* grow in close proximity.

P. poae-nemoralis Otth [271]

In their rearrangement of the grass rusts in the "poae-nemoralis" group, Cummins and Greene (1966) reduced this species to a variety of *Puccinia brachypodii* (q.v.).

P. poarum Niels. [274]

During a general review of rust fungi of Aveneae, Greene and Cummins (1967) concluded that there is a series of morphologically similar rusts producing aecidia on various genera of Compositae, all of which should be assigned to *P. poarum*.

P. pygmaea Ericks. [276]

As a consequence of the revision of the *P. pygmaea* complex by Cummins and Greene (1966), British collections with uredosori and teleutosori on *Ammophilia* should be placed in *P. pygmaea* var. *ammophilina* (Mains) Cummins and Greene; and those on *Calamagrostis* in *P. pygmaea* var. *pygmaea*.

P. recondita Rob. & Desm. [278]

Add reference: Map No. 266.

f.sp. **agrostidis** Oud. [280]

Add synonym: *Aecidium aquilegiae* Pers., Icon. pict. rar. fung. 4:58 (1803) (*n.v.*), from Plowright, p. 263 (1889).

f.sp. **bromina** Eriks. [282]

Urban (1966 & 67) recognises this as a separate species, *Puccinia bromina*, with two varieties.

f.sp. **holcina** Eriks. [285]

This rust is now considered to be distinct at specific level following a reappraisal of rusts forming aecidia on *Allium* species by Greene & Cummins (1967), and is treated here as *Puccinia holcina*.

f.sp. **persistens** Plowr. [286]

Add synonym: *Aecidium hellebori* Fischer, Ured. Schweiz, p. 526 (1904), from Grove, p. 386 (1913).

Experimentation has revealed that there are at least two distinct physiologic races of this rust (Ondráčková & Urban, 1972).

f.sp. **tritici** Eriks. & Henn. [289]

Add synonym: *Aecidium clematidis* DC., Flor. Fr. 2:243 (1805), from Plowright, p. 265 (1889).

P. holcina Eriks. [285 & 290]

Add synonym: *Puccinia schismi* Bub. Ann. K. K. Naturh. Hofmus, Wien, 28:193 (1914).

The position of *P. holcina* as a race or variety of *P. recondita* had often seemed anomalous. Greene & Cummins (1967) proposed unification with the *P. schismi* group. However Cummins' (1971) later proposal to sink this grouping under *P. hordei* seems to involve too much lumping and is not followed here.

Cumminsiella mirabilissima (Peck) Nannf. [300]

Add reference: CMI No. 261.

The hosts of this fungus deserve more attention. *Mahonia bealei* is now preferred to *M. japonica* var. *bealei*.

Tranzschelia discolor (Fuck.) Tranz. & Litv. [304]

Add reference: CMI No. 287 and Map No. 223.

Baker (1972) reports records on *Anemone* from several counties, together with serious defoliation of plum, especially cultivar "Victoria". Price (1978), in studying the etiology of the rust in relation to regular outbreaks on seedling *Anemone* at Rosewarne E.H.S., Cornwall, is investigating the host status of species of *Prunus* in Britain. Inoculations using aecidiospores from *Anenome* leaves successfully infected plum (*P. domestica*), but failed to infect sloe (*P. spinosa*), Price (*in litt.*).

Ultrastructural studies (Bennell and Henderson, 1978) have revealed that the distinguishing character of *T. discolor*, whereby the lower cell of its teleutospore appears lighter brown, and almost smooth, in contrast to the dark brown, spiny-warted nature of both cells in *T. pruni-spinosae*, results from a retarded development of the mature spore wall in this lower cell.

T. pruni-spinosae (Pers.) Diet. [307]

Add reference: CMI No. 288 and Map No. 223.

It is uncertain whether this rust occurs in Britain. Supposed collections on *Prunus spinosa* conform morphologically to *T. discolor*, the lower cells of the teleutospores being smooth and dark brown, but in many cases the host identification is equivocal. In Europe, however, where the haplont stages do occur on *Anemone ranunculoides*, collections on *Prunus spinosa* consistently exhibit identical upper and lower cells in the teleutospore.

Endophyllum euphorbiae-sylvaticae (DC.) Wint. [308]

Additional record: on *Euphorbia amygdaloides*, Berry Head, Devon, 1970, *Webster* (E).

Uromyces ficariae Tul. [310]

The presence of uredospores of this rust in Britain was in some doubt, but *Hudson* found them in a collection in 1970 at Cambridge (E). The author citation has been corrected following Laundon (1974).

U. behenis (DC.) Unger [311]

Additional record: Mull, ix 1968, *Henderson* (E), aecidia only.

U. dianthi (Pers.) Niessl [312]

Add reference: CMI No. 180 and Map No. 453.

U. sparsus (Schum. & Kze.) Cooke, Microscopic Fungi, p. 214 (1865). [314]

This is the correct author citation (Laundon, 1967).

U. betae Kickx, Fl. Flandres 2:74 (1867). [315]

Add reference: CMI No. 177, and Map No. 265.

The above is probably the correct author citation according to Laundon (1967). Baker (1972) makes reference to outbreaks on sugar beet and mangolds (*Beta vulgaris* subsp. *vulgaris*).

U. salicorniae de Bary [317]

Add new host: *Salicornia perennis*, Felixstowe, Suffolk, viii 1966 (E).

U. geranii (DC.) Fries, Summa Veg. Scand. p. 514 (1849). [318]

Add reference: CMI No. 270.

Add new British host: *Geranium pratense* var. *album*, Logan Botanic Garden, Wigtownshire, 1972, *Henderson* (E).

The author citation is corrected, following Laundon (1967). A scanning electron microscope survey of *Uromyces* species on *Geranium* in Europe, distinguished *U. geranii* by virtue of its quite smooth teleutospores (Dennis and Pegler, 1975).

U. appendiculatus (Pers.) Unger [321]

Add reference: CMI No. 57 and Map No. 290.

U. viciae-fabae (Pers.) Schroet. [323]

Add reference: CMI No. 60 and Map No. 200.

Add probable synonym: *Puccinia fallens* Cooke, J. Bot. 4:105 (1866), (Laundon, *in litt.*).

U. fallens (Arth.) Barth. [326]

The author citation is corrected, following Laundon (1973). All workers agree that this taxon is distinguished from *Uromyces trifolii-repentis* by having more pores in its uredospores (4–7 vs. 2–3), but Cummins (1977) feels that this merits only varietal status. Laundon (1973) examined the macrocyclic clover rusts in New Zealand, and concluded that *Uromyces fallens* is restricted to *Trifolium pratense*. The British records on *T. medium* and *T. incarnatum* therefore require further attention.

U. minor Schroet. [327]

Additional records: on *Trifolium dubium*, Tipperary, Eire, 1966, *McGarvie* (E); Swanage, Dorset, 1968, *Schofield* (E); Clovelly, Devon, 1974, *Clark*, (E).

U. trifolii (R. A. Hedw. ex DC.) Fuck., Symb. Myc. p. 63 (1870). [328]

Following the studies of Walker (1978) this is now considered to be the most appropriate name for the microcyclic rust of white clover (*Trifolium repens*). In the absence of a type specimen and because of the inadequacy of the original description, Walker recommended rejection of *U. nerviphilus* (Grognot) Hotson. The name *U. flectens* Lagh., preferred by Jørstad (1967), is reduced to synonymy. Jørstad also noted that although the macrocyclic *U. trifolii-repentis* (q.v.) produces morphologically similar teleutospores on *Trifolium repens*, it can be distinguished by virtue of its small, scattered sori, which contrast with the larger sori of the microcyclic *U. trifolii* which aggregate chiefly along leaf nerves and on pedicels and stems.

U. pisi-sativi (Pers.) Liro, Uredineae Fennicae, p. 100 (1908). [330 & 333]

This is the correct name for the rust previously cited as *U. pisi* (DC.) Otth.

Add reference: CMI No. 58 and Map No. 404.

Add new host in Britain: *Cytisus battandieri*, Chobham, Surrey, 1972, on plants imported from France. It has also been reported on *Cytisus* hybrids (presumably *Sarothamnus* cultivars) in frames in Surrey, 1969 (Plant Path. Lab.). There have been further records on crops of lucerne (*Medicago sativa*) in Sussex and Kent (Baker, 1972). Additional reference to this rust is available under the name *Uromyces striatus* CMI No. 59 and Map No. 342.

U. trifolii-repentis Liro. Acta Soc. Fauna Flora Fenn. 29:15 (1906). [337]

This is the correct name for the macrocyclic rust of *Trifolium repens*, of which a separate *forma specialis* also occurs on *T. hybridum*.

The confusion surrounding the use of the name *U. trifolii* (Hedw. f. ex DC.) Fuck. and the correction of the author citation were resolved by Walker (1978), who applied this name to the microcyclic rust of *T. repens*. Although the teleutospores of the two species are similar, the form of the teleutosori differ, being small and scattered in *U. trifolii-repentis*, as pointed out by Jørstad (1967).

U. polygoni-avicullariae (Pers.) Karst. [342]

Additional records of aecidia: on *Polygonum aviculare*, E Lothian, vi 1968, *Henderson* (E); and from Silwood, Berkshire, vi 1978, *Wheeler* (E). Spermogonia were found only in the latter collection.

U. rumicis (Schum.) Wint. [343]

The existence of the aecidial stage of this rust in Britain was unconfirmed until *Rumex obtusifolius* was successfully inoculated with aecidiospores from *Ranunculus ficaria* collected at Balerno, Midlothian, in 1960. Abundant uredospores and teleutospores developed (E).

The confusion of this rust and *Uromyces dactylidis*, of which the aecidial stage also occurs on *Ranunculus ficaria*, can now be resolved following the work of Holm (1964), who recorded the diagnostic presence of "refractive granules" in the wall of *U. rumicis* aecidiospores.

U. limonii (DC.) Berks., Outl. Brit. Fungology, p. 333 (1860). [346]

A corrected author citation (Laundon, 1967).

U. gentianae Arth., Bot. Gaz. 16:227 (1891). [347]

This is the correct name for *Uromyces eugentianae* Cumm. which becomes a synonym (Laundon, 1967).

U. scrophulariae Fuck. [347]

Additional record: on *Scrophularia scorodonia*, St. Ives, Cornwall, 1975, *Renwick*, (E).

U. valerianae Fuck. [348]

A corrected author citation (Laundon, 1974)

U. aloes (Cooke) Magn. [349]

Add reference: CMI No. 268.

Additional record: on imported *Aloe* sp., Wiltshire, 1962 (Brooks, 1966).

U. ambiguus (DC.) Fuck., Symb. Myc. p. 64 (1869). [349]

A corrected author citation (Laundon, 1967).

The rust is now known from two additional collections on *Allium babingtonii*, from Connemara, Ireland, and the Lizard, Cornwall, 1972, *Miller* (E).

U. aecidiiformis (Str.) Rees [352]

Additional record: on *Lilium* aff. *martagon*, Lyme Regis, iv 1932, *Ramsbottom* (K).

U. transversalis (Thuem.) Wint., Flora 42:263 (1884).

A new introduction, on three consignments of imported cut *Gladiolus* sp. from S Africa, 1968; uredospores only (Plant Path. Lab.).

Spermogonia and *aecidia* absent. *Uredosori* amphigenous, scattered or grouped, 0·3–1·5 mm long, round or transversely oblong, long covered by the epidermis, yellow-brown; uredospores yellow, globose, ovate or oblong, 14–26 × 13–19 μm, wall 1·5–2·5 μm thick, minutely verruculose, with 6–8 small scattered germ pores. [*Teleutosori* similar, but smaller, black; teleutospores separated into groups by bunches of palisade-like, closely-packed, yellow-brown paraphyses; teleutospores ovate, ellipsoid or pyriform, rarely subglobose, light brown, darker at the apex, which is rounded, truncate or conically attenuate, base attenuate or rounded, 20–34 × 14–21 μm; wall smooth 1·5–2·0 μm thick, thicker at apex, pedicel hyaline, slender to 45 μm.]

This species is only distinguished from *U. gladioli* in having paraphysate teleutosori, although each rust attacks different species of *Gladiolus*.

U. muscari (Duby) Graves, Cat. p. 280 (1857). [353]

This is a corrected author citation (Laundon, 1967). The confused synonymy of this species was discussed by Savile (1961) and further considered by Laundon (1974).

Additional host: the hybrid *Endymion non-scriptus* × *hispanicus*, Edinburgh, 1966 (E).

U. lineolatus (Desm.) Schroet. [357]

Add synonym: *Aecidium glaucis* Dozy & Molk. Tijdschr. v. Natur. Ges. 12:16 (*n.v.*), from Plowright, p. 268 (1889).

U. dactylidis Otth [360]

Note that the apparent confusion between the aecidial state of this rust on *Ranunculus ficaria* and the aecidia of *U. rumicis* has been resolved by Holm (1964). The latter are distinguished by "refractive granules" in the aecidiospore walls.

The aecidia on *R. sceleratus* have still not been shown to correspond to any of the particular grass races.

Trachyspora intrusa (Grev.) Arth. [364]

Ultrastructural investigations of the uredinoid aecidia in this species (Henderson, 1973) have revealed the development of these spores and clarified their morphology. Differentiated wall regions constituting germ pores were found in the spores, and the ontogeny of the spine-like ornamentation confirmed the aecidial nature of the sori.

Uredo behnickiana P. Henn. [366]

New British cultivated hosts: *Laelia* sp. and *Oncidium* sp., Somerset, 1963 (Baker, 1972).

U. epidendri P. Henn.

A new introduction on *Epidendrum paniculatum*, East Grinstead, Sussex, 1967 (Plant Path. Lab.), imported from Brazil.

Uredosori amphigenous on large, swollen, red areas, rusty-brown, 0·5–1·0 mm diam.; uredospores subglobose, ovate to ellipsoid, 22–35 × 16–24 μm, sparsely aculeate, wall hyaline-yellow, 2·5–3·5 μm thick, with 2 equatorial germ pores.

Acknowledgment

A. P. Bennell thanks the Department of Agriculture and Fisheries for Scotland for the award of a Junior Research Fellowship.

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