L.C. (Ed. 11) No. **1925**

Arum neglectum (Towns.) Ridley (*Arum italicum var. neglectum* Townsend; *Arum italicum* auct. angl. non Mill.)

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A robust perennial, 15–20 cm., with 4–8 radical leaves springing from a stout stem. Corm 3–6 cm. in diameter, of approximately the same length, with the shoot produced almost apically (i.e. the corm is normally not so horizontally placed as that of *Arum maculatum*.) Leaf lamina slightly leathery, rather thicker than in *A. maculatum*, hastate, light to dark bright green; the lobes 7–11 × 5–7 cm., the angle between the lobe and the petiole being about 40–45°. The laminae are rarely marked with dark spots; if present they usually have a regular outline. Veins pinnately branched, light green, rarely white. Petiole channelled above, 15–30 cm. Petiole/leaf length ratio greater than in *A. maculatum*. Hibernal leaves similar, but the hastate character is rather less marked. Stomatal index 10–13 (cf. *A. maculatum*, S.I. 7–11. 5).

Flowers monoecious, protogynous on a vertical axis which is prolonged as the yellow spadix (5–6 × 0·5 cm.) to rather more than one-third of the height of the spathe. Spathe tapering, 20–40 cm. long, rather broader than in *A. maculatum*, drooping rather early, the margins overlapping, sometimes pinkish at the base, shrivelling after flowering, very rarely spotted. Inflorescence axis bearing (in order from the base downwards): (*a*) a zone of 40–60 sterile male flowers reduced to hairs, 4–7 mm. long, (*b*) a zone of *c.* 100–150 yellow anthers, 1·5–2 mm. long, dehiscing longitudinally, (*c*) 40–70 pale green syncarpous unilocular ovaries 35 mm. long with evanescent stigmas; the highest row are sterile. Infructescence 10–25 cm. long, a bare spike of berries which are scarlet when ripe, containing 1–2 (rarely more) reticulated seeds.

First described in the British Isles by A. Hambrough (1854), when it was identified as *A. italicum* Miller. Subsequently Townsend (1883) distinguished it from *A. italicum* as var. *neglectum*. It was raised to specific rank by Ridley (1938).

The cause of the dark patches on the leaves is obscure. Ridley (1938) regards all spotted forms as hybrids with *A. maculatum*, but the two species are not readily interfertile. Other spotted forms have occurred amongst seedlings grown by the writer. The spots are not due to anthocyanin in the normal state for they do not give the usual anthocyanin reactions. The same applies to *A. maculatum*, and Robinson & Robinson lists this (1931) plant as lacking anthocyanin. Möbius (1927), however, lists *A. maculatum* as containing anthocyanin. The leaves of *A. neglectum* give the sodium picrate reaction for cyanophoric glucoside like *A. maculatum*.

Native. A plant of light shade on good soils, restricted to the south and south-west of England, usually within 1 mile (1·6 m.) of the sea.

I. *Geographical and altitudinal distribution.* *A. neglectum* is recorded with certainty from nine vice-counties. It is recorded from the Scilly Isles (St Mary), and in parts of west Cornwall (1) it is as common as *A. maculatum*. Here, forms resembling *A. italicum* exist, but the range of intermediates is not so great as that in south-eastern Jersey In east Cornwall (2) there are records from the coastal areas, as also from south Devon (3)

(but see below), Dorset (9), south Hants (11, 12). In the latter county it occurs up to 15 miles (24 km.) from the sea. It is also found in the Isle of Wight (10), where it was originally recorded as British, and in west Sussex (13), where the species reaches its present eastern limit at Lancing. One still more easterly locality at Southwick (14) is not included in the above list as *A. neglectum* has not been refound there recently. There are records for Guernsey, Jersey and Alderney (Channel Islands).

The record from north Devon (4) in the *Flora of Devon* (1949) is an error. To quote from the *Flora* 'of two large gatherings sent to Kew the second was determined as mainly *A. neglectum* with several intermediate forms between *A. italicum* and *A. maculatum*' (Martin & Fraser, 1939). The writer visited this area with the finder (Dr F. R. Elliston Wright), and it was clear the record was an error, all the plants being variants of *A. maculatum*. Doubt attaches to the following Devon localities also taken from the *Flora*: Newton near Dartmouth, Sidmouth, Salcombe Regis, Torquay. Though all these places include suitable habitats I have yet to discover a correctly identified herbarium specimen from them and the local botanists have not seen the plant. It is known with certainty from Thurlestone on Bigbury Bay; it probably occurs at Hope Cove; Sidford; and persists (1951) in the garden at Fursdon, Plymouth (Briggs, 1888).

The record for Bath, north Somerset (6) (Stephenson, Torquay Herb.) is an error; as is most likely the record from Minehead, south Somerset (5) (Crawshaw, Torquay Herb.).

The record from Glamorgan (41) is also open to doubt. This plant was identified as *A. neglectum* on the ground that it possessed a yellow spadix and flowered in June, but positive identification on these two characters alone is not possible. It had been observed some years prior to this flowering, but 'it did not flower so nothing definite could be decided about it' (E. Vachell). Now the leaf seasons of the species are so different that it could easily have been decided. The failure to note the very early leaf appearance casts grave doubt on this record and the specimen in the British Museum herbarium is most unconvincing.

Again despite the records, the plant is almost certainly absent from Kent (15), for continued search by Mr F. Rose and myself has failed, only *A. maculatum* being found in each case. Careful reading of the original reports (Melvill, 1888; Briggs, 1888) suggests that Melvill was not familiar with the plant and that he was in error.

In Guernsey, *A. neglectum* is found in a few localities which are very similar to those in the west of England. In Jersey, *A. neglectum* is abundant in the south-east of the island together with the continental *A. italicum*, and a continuous intergrading series is to be found. In the north of the island it is much less common; in the central valleys, e.g. Waterworks valley, Vaux valley, it is very common, but the plant more closely resembles the British form. A similar position exists in Alderney, where both *A. neglectum* and *A. italicum* can be found growing together.

The distribution of this species outside Britain is very inadequately known. Ridley (1938) says the plant is confined to south and west Britain, the Channel Isles and the north-west coasts of France, though he gives no evidence for the Continental distribution beyond a possible reference to the plants in Rouy & Foucaud's *Flore de France* (1912) under the name *A. italicum* var. *immaculatum* DC., where it is described as having 'Feuilles luisantes, non vairées de blanc jaunatre, ni maculées'. On the other hand, Townsend (1883) writes: 'The Isle of Wight form is rare on the Continent though I have it from Cannes as well as the usual form from Bordighera and both retain their characters in

cultivation.' A further possible reference is to be found in Boreau (1857): 'L'*Arum italicum* du Centre a rarement ses feuilles veinées de blanc. Je l'ai vu en cet état dans le vallée de l'Indre près de Clion, Châtillon, etc.' A definite reference occurs in Chevalier (1942): 'Cette forme *neglectum* se recontre ça et la dans la N.W. de la France près des

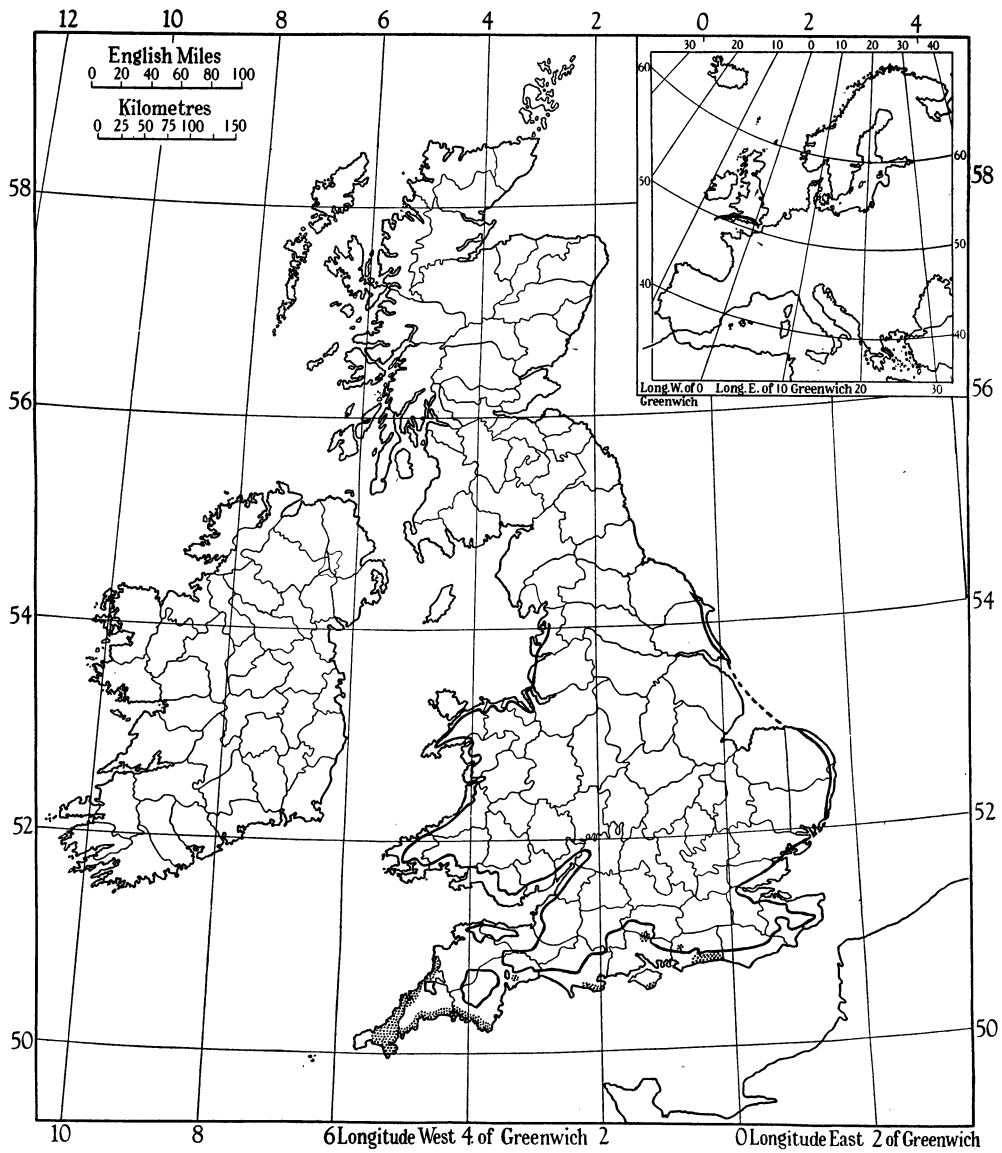

Fig. 1. The distribution of *Arum neglectum* (Towns.) Ridley. The area south of the continuous lines (or excluded by them) has 0–5 mornings per year with snow lying. Data from Manley (1947).

lieux anciennement habités. Cherbourg (R. Herpin), Parc de Matthieu (A. Bigot).' Identification from herbarium material is difficult, but examination of such supports the view that *A. neglectum* may occur more widely on the Continent than Ridley would suggest.

In fact, in view of what may be seen in south-east Jersey, and the above quotations, it may be that the specific distinctions between the two are untenable on the Continent.

In England ascends to 768 ft. (234 m.) at Petersfield 'where it is depauperate' (Ridley, 1938), but the writer has not seen it above 700 ft. (213 m.)

II. *Habitat.* (*a*) *Climatic and topographical limitations.* Salisbury (1939) correlates the southern oceanic distribution with a susceptibility to severe frost throughout the winter. There is a correlation between the distribution of the species and the snow-cover line as shown on the map (Fig. 1). The climatic factors which influence the absence of snow-cover may well be important, since *A. neglectum* grows in situations where snow is likely to lie. Direct damage by snow is not likely, but ice resulting from partly thawed and refrozen snow is known to kill the seedlings.

In the west of England the distribution roughly coincides with those soils having the least lime requirement (data from Blenkinsop, 1946). In the south-east of England the plant occurs on a variety of deep soils (e.g. base of calcareous scarps, drift, alluvium) where there is a high water content. Slight shade is usual, but the plant tolerates higher light intensities than *A. maculatum.* Investigations at Arundel (west Sussex) on the lines of those of Rutter & Blackman (1946) show the distribution to be correlated with height above a base-line, i.e. slope and not light intensity. Thus in this case, a soil factor, most likely water supply, was the factor determining *Arum* density.

(*b*) *Substratum.* The following sites are characteristic: the west of England at the foot of and in crevices in the stone walls in sheltered lanes. Soil a fine loam (e.g. Penzance) with pH = 6·0 (colorimetric). In Dorset it occurs on soils derived from the Purbeck Series (pH = 6·7–8·0) (colorimetric). In Hants and Sussex it often occurs at the base of steep slopes on deep soils with high exchangeable calcium, usually not far from an obvious water supply. At Arundel, the soil is of a rendzina type; on the surface 2–3 cm. litter, followed by 20–25 cm. loam containing fine particles of chalk. Below this is an extensive zone of moist finely powdered and compacted chalk. Rate of decay of leaves is rapid, being incorporated in the soil within a year. pH = 8·0 (colorimetric).

In the Channel Isles the plant occurs in the sheltered lanes and roadsides under light shade. On a roadside at Samares, Jersey, associated species included:

Corylus avellana	f.	Dactylis glomerata	a.
Rubus fruticosus agg.	f.	Hedera helix	f.
Ulmus spp.	f.	Mercurialis annua	f.
		Rumex acetosa	f.
Ballota nigra	f.	Sonchus oleraceus	o.
Cotyledon umbilicus	a.	Urtica dioica	f.
Galium aparine	a.		

III. *Communities.* Near Penzance the plant grows in the banks of the lanes, nearly always in light shade. The following species occur with the plant:

Alliaria petiolata	a.	Melandrium dioicum	a.
Geranium robertianum	a.	Taraxacum officinale	o.
Hedera helix	a.	Urtica dioica	f.
Lonicera periclymenum	o.		

Near Polperro (Cornwall) the plant grows on the open cliff slope well sheltered by shrubs such as *Sambucus nigra, Prunus spinosa* and *Hedera helix* which are wind-pruned. The

plant is in little shade when the leaves are well up, and the habitat bears a resemblance to those of Dorset. Other associated species include:

Agrostis stolonifera	o.	Rubus fruticosus agg.	a.
Brachypodium sylvaticum	o.	Stellaria holostea	f.
Galium mollugo	o.	Teucrium scorodonia	o.
Plantago lanceolata	r.	Urtica dioica	f.
Poa pratensis agg.	o.		

At Thurlestone (south Devon) the locality is a sheltered lane on rocks of the Lower Devonian (Meadfoot Series). Associated species include:

Crataegus monogyna	o.	Ranunculus repens	o.
Dryopteris spinulosa	o.	Rumex crispus	o.
Hedera helix	a.	Senecio vulgaris	r.
Linaria cymbalaria	o.	Smyrnium olusatrum	a.
Poa pratensis agg.	f.	Sonchus oleraceus	r.
Phyllitis scolopendrium	o.	Urtica dioica	a.

In Dorset it occurs on the limestone of the Purbeck Series. Two types of habitat may be seen, one very local, in open grassland dominated by *Brachypodium pinnatum*. The plant is not luxuriant, but possibly gains protection from the *B. pinnatum*, which is very persistent in winter. Associated species include:

Agrimonia eupatoria	o.	Daucus carota	o.
Blackstonia perfoliata	r.	Holcus lanatus	f.
Anthyllis vulneraria	r.	Linum catharticum	o.
Brachypodium pinnatum	d.	Medicago lupulina	o.
Briza media	f.	Poterium sanguisorba	f.
Centaurea nigra agg.	o.	Knautia arvensis	o.
Cirsium acaulos	r.	Senecio jacobaea	o.
Dactylis glomerata	f.		

More frequently it occurs in scrub on the east side of limestone walls, and rarely on the western side where the scrub is less well developed. The following species occurred in one locality:

Rubus fruticosus agg.	a.	Convolvulus arvensis	f.
Prunus spinosa	f.	Cyonosurus cristatus	f.
Hedera helix	f.	Dactylis glomerata	f.
		Daucus carota	o.
Agrimonia eupatoria	o.	Holcus lanatus	f.
Agrostis stolonifera	f.	Iris foetidissima	o.
Arum maculatum	o.	Phleum pratense	f.
Brachypodium pinnatum	r.	Picris hieracioides	r.
Brachypodium sylvaticum	o.	Prunella vulgaris	o.
Cirsium arvense	f.	Trisetum flavescens	f.
Cirsium eriophorum	o.		

At Arundel (west Sussex) at the base of a wooded chalk escarpment, the following occur:

Acer pseudo-platanus	s.d.	Atropa bella-donna	r.
Aesculus hippocastanum	o.	Calystegia sepium	o.
Fagus sylvatica	d.	Cynoglossum officinale	r.
Hedera helix	o.	Dipsacus pilosus	r.
Quercus ilex	r.	Eupatorium cannabinum	r.
Buxus sempervirens	r.	Galeobdolon luteum	f.
Clematis vitalba	f.	Mercurialis perennis	a.
Cornus sanguinea	l.	Glechoma hederacea	a.
Crataegus monogyna	f.	Rubia peregrina	r.
Euonymus europaeus	r.	Solanum dulcamara	f.
Fraxinus excelsior	o.	Urtica dioica	a.
Ligustrum vulgare	l.	Valeriana officinalis	r
Prunus spinosa	r.		
Rubus fruticosus agg.	o.		
Sambucus nigra	a.		

IV. *Response to biotic factors.* Both spathe and spadix are freely eaten by slugs and snails.

V. (*a*) *Gregariousness.* Grows in large clumps; in really favourable habitats the clumps coalesce so as to cover areas of a square metre or more.

(*b*) *Performance in various habitats.* Flowers freely in most habitats, the leaves reaching a height of 40 cm. in the most favourable localities.

(*c*) *Effect of frost, drought, etc.* The plants in the writer's garden were unaffected by the severe winter of 1947, apart from the weighing down of the leaves by snow. Damage to seedlings was observed, five out of eight not surviving.

The adult leaves are less liable to scorch by intense light than those of *A. maculatum.*

VI. (*a*) *Morphology.* The corms are slow-growing, reaching a maximum diameter of 4 cm. and contain raphides. They produce roots in September or October, shortly afterwards a shoot, and the hibernal leaves are fully expanded by late October. The tubers occur at a depth of 12–20 cm. below the surface, and as in *A. maculatum* a new corm is produced each year. The roots are 30 cm. or more in length, and are contractile.

(*b*) *Mycorrhiza.* Endotrophic mycorrhizal association (Rayner, 1927). See also Magrou (1936) for the mycorrhizal synthesis in *A. italicum.*

(*c*) *Perennation*; *reproduction.* Stem tuber (corm) geophyte. By the beginning of August the leaves have withered and only the axis bearing the red berries remains. The corm at this stage is dormant.

Daughter tubers are budded off from the mature tuber and develop more rapidly than the seedling. The longevity of the individual plant is not known, but the age at first flowering is about the fifth year. Seed is set every year.

(*d*) *Chromosome number.* $2n = 83$ in two plants from Steyning, Sussex; $2n = 84$ in two plants from Dorset; $2n = 84$ in one plant from the Isle of Wight (Lovis, unpubl.) $2n = 63$ for *A. neglectum* (Haskell, 1951) is a misquotation from Dangeard. $2n = 64$ for *A. italicum* (Dangeard (1937), using French material and counting at meiosis.) $2n = 84$ from Chelsea Physic garden (Lovis unpubl.). $2n = 84$ from Kew (Prime unpubl.).

VII. *Phenology.* The roots are first produced in early autumn and maximum growth of the tuber occurs in spring. The leaves appear above ground in autumn (late September or October), the summer foliage appearing in March or April. The leaves of seedlings may appear earlier, even in late August. Flowers in May or June, producing 1–2 flower spikes per corm (three weeks or a month later than *A. maculatum*). The time of maturation of the seeds is August. The seeds germinate in spring and produce the first leaf the following autumn.

VIII. (*a*) *Mode of pollination.* The pollination mechanism is precisely similar to *A. maculatum*, midges of the genus *Psychoda* being by far the most frequent visitors. On one occasion numerous specimens of a fly, *Limosina crassimana* Hal., were found in several spathes, so this insect may play a part in pollination. There are no cleistogamic flowers, reproduction is amphimictic and there is no vivipary.

(*b*) *Hybrids. A. neglectum* and *A. italicum* are interfertile, particularly if *italicum* is used as the female parent. The hybrids show all gradations between the two species.

All attempts by the writer to cross *A. neglectum* with *A. maculatum* have failed, but hybrids in nature do occur very rarely. One suspected hybrid colony at Arundel showed $2n = 70$ (Lovis, unpubl.). All the *maculatum* plants used in these experiments had 56 chromosomes; it is more likely that the race of *A. maculatum* with 84 chromosomes (Maude, 1940) would cross with *A. neglectum*, but the writer has not located this plant.

(*c*) *Seed production and dispersal.* 636 berries of *A. neglectum* were found to contain 754 ripe seeds, an average of 1·4 seeds per berry. 732 seeds weighed 29·2 g., an average of 0·040 g. per seed. The number of berries per spike is 53 (mean of 20 counts). (Material from Arundel, west Sussex.) Dispersal is by birds, or the infructescence falls to the ground, or the ripe berries fall off.

(*d*) *Viability of seeds*; *germination.* The seed loses its viability after the first year. None of 84 seeds collected in the Isle of Wight in 1947 germinated in 1949. 84 seeds sown in boxes of soil in 1949 showed 27 seedlings in 1950, a percentage of 29. No light sensitivity was observed.

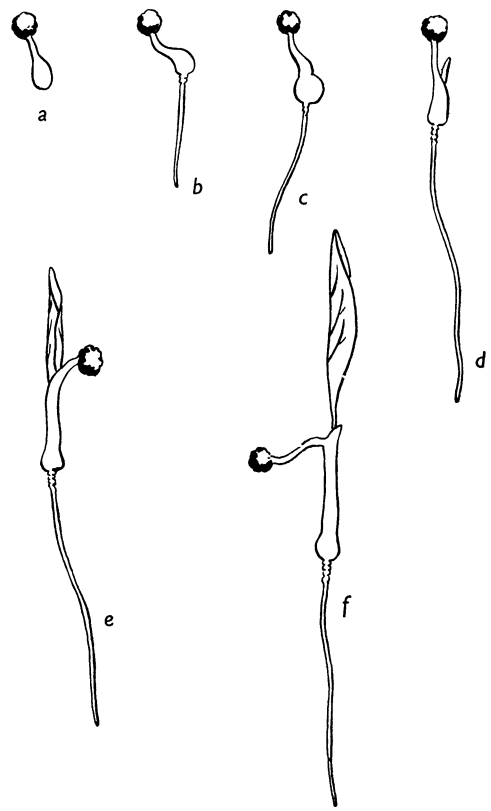

Fig. 2. Stages in the germination of *A. neglectum.* Approx. nat. size. *a.b.c.*, February to April; *d.e.f.*, October to November.

(*e*) *Seedling morphology.* Germination is as *A. maculatum*, with the first leaf appearing in the autumn. Occasionally two leaves are produced in the first season.

(*f*) *Effective reproduction.* Once the species is established in favourable habitats vegetative reproduction is more important than multiplication by seed.

IX. (*a*), (*b*), (*c*). *Animal feeders and parasites, plant parasites, diseases.* No information.

X. *History.* See under third paragraph (p. 241).

A distinct plant such as this would hardly fail to have been noticed before 1854, so it is probably a recent introduction. If it is still spreading then some of the suggestions made in (II) above may have to be modified.

More information about the status of the plant on the Continent is required, since it may not be specifically distinct from *A. italicum* there. *A. italicum*, of which *A. neglectum* is an extreme form, is cultivated in Britain and has occurred as a garden escape, particularly in the west of England.

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