J. E. Dandy & G. Taylor's unpublished study of *Potamogeton* × *sudermanicus* Hagstr. in Britain, with an account of the current distribution of the hybrid

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ABSTRACT

In 1942 J. E. Dandy & G. Taylor prepared an account of *Potamogeton* × *sudermanicus* (*P. acutifolius* Link × *P. berchtoldii* Fieber), a hybrid they reported as new to the British Isles on the basis of specimens collected near Wareham in Dorset (v.c. 9). The paper was intended for the *Journal of botany* but the journal ceased publication before it could appear. The text of the paper is published here for the first time. The hybrid was first collected in the Wareham area by J. H. Salter in 1920 or 1921. Recent surveys show that the hybrid is more frequent than *P. acutifolius* and grows in the absence of *P. berchtoldii*.

KEYWORDS: *Potamogeton acutifolius*, *P. berchtoldii*, Potamogetonaceae, vegetative reproduction.

INTRODUCTION

Our current understanding of the genus *Potamogeton* in the British Isles rests on foundations laid by J. E. Dandy and G. Taylor, colleagues at the Natural History Museum, London, who collaborated closely on taxonomic studies of the genus from the mid 1930s until Taylor left the Museum for Kew in 1956. One result of their work was a series of papers in the *Journal of botany* entitled "Studies of British Potamogetons", 18 of which were published between 1938 and 1942. In our view, these papers represent "one of the most critical and scholarly contributions made this century to the taxonomic study of the British flora" (Preston 1995a). This series of papers stopped abruptly when the *Journal of botany* ceased publication in 1942.

In 1985 C.D.P. visited Sir George Taylor, who generously lent him a copy of the manuscript monograph *The British species of* Potamogeton *L.*, which Dandy & Taylor had prepared but never published, together with other associated papers. Included amongst the latter was the completed typescript of a 19th paper in the "Studies of British Potamogetons" series. This paper covers *Potamogeton* × *sudermanicus* Hagstr., the hybrid between *P. acutifolius* Link and *P. berchtoldii* Fieber, and was virtually ready for publication when the *Journal of botany* folded. The hybrid had been detected by Dandy & Taylor from herbarium specimens collected near Wareham in Dorset (v.c. 9). It still survives in this locality, but has not been found elsewhere in Britain. The record of *P.* × *sudermanicus* was published by Good (1948) and included in Dandy's (1975) treatment of the British hybrids.

In this paper we publish the text of Dandy & Taylor's paper, which still merits publication for its treatment of the history and taxonomy of *P.* × *sudermanicus* in Britain (a striking illustration of the long shelf life of taxonomic publications). It is also of historical interest as a fine example of the work of Dandy & Taylor. Finally, the belated publication of this paper is an appropriate way to mark the 60th anniversary of the start of the "Studies of British Potamogetons" series in 1938.

We have ourselves been interested in the hybrid *P.* × *sudermanicus* for some years, making repeated

visits to the Wareham area to study its distribution in relation to that of its parents. We therefore follow Dandy & Taylor's paper with an updated account of the distribution of the hybrid in Dorset.

DANDY & TAYLOR'S UNPUBLISHED STUDY

THE TYPESCRIPT

The paper on *P.* × *sudermanicus* was initially numbered "Studies of British Potamogetons. – XVII", showing that it was written before the publication of Studies XVII and XVIII. In the event Studies XVII and XVIII were taken up with papers furthering the controversy between Dandy & Taylor and Professor J. W. Heslop Harrison, which appeared in the issue of the *Journal of botany* intended for publication in July 1942 (although not published until April 1944). Although the typescript is not explicitly dated, there is strong internal evidence that the copy in Taylor's possession was typed between June and October 1942. It discusses the collections of *P.* × *sudermanicus* made by F. C. Steward in June 1942, but details of his collections made in October 1942 are added in handwritten annotations. Further evidence comes from the fact that the typed phrase "This year..." has been altered twice by hand, initially to "Last summer..." and then to "In 1942...".

There is little doubt that the collapse of the *Journal of botany* was the main reason why Dandy & Taylor's 19th Study was never published. The *Journal of botany* had become closely associated with the Botany Department of the British Museum (Natural History) during the long period (1880–1924) when it was edited by James Britten, and it came to serve in place of an official periodical (Steam 1981). John Ramsbottom, the Museum's Keeper of Botany, took over the editorship in 1938. The burden of running the Department of Botany in wartime must have been considerable, but in 1985 Taylor still blamed Ramsbottom's laziness for the collapse of the *Journal*. Ramsbottom had many gifts but his fellow mycologist G. C. Ainsworth (1986) noted that "to exasperate people by procrastination was an integral part of his character".

Letters from Taylor to Dandy now held in the manuscript collection of the Natural History Museum (DF440/63) show that Taylor pressed Dandy to publish the note on *P.* × *sudermanicus* after 1942, initially with papers on *P.* × *suecicus* published in the *Transactions of the Botanical Society of Edinburgh* (Bance 1946; Dandy & Taylor 1946). On 20 May 1945 Taylor wrote to Dandy and after discussing the *P.* × *suecicus* papers added "We might also put in the paper on *sudermanicus* if you can lay hands on it". On 3 July 1945 he reverted to this suggestion: "There should be no difficulty in getting the *suecicus* papers to [H.R.] Fletcher by the end of September. Do you think that we could plug in another paper of Pot records at the same time? He seems quite keen to have them and here is a grand opportunity for a grand slam. What about the *sudermanicus* effort as well? I do realize how much work will be required to prepare all these for publication but if you can let me know how I can help I shall gladly do so." Both *P.* × *suecicus* papers were read by title at a meeting of the Botanical Society of Edinburgh on 13 June 1946 and subsequently published. Another paper by Dandy & Taylor, "New and interesting British records of *Potamogeton*", was read by title on 15 May 1947, usually a formal prelude to publication, but it never appeared in print. On 13 June 1947 Taylor forwarded to Dandy some photographs of the leaves of *P. acutifolius* and *P.* × *sudermanicus* taken by Miss H. M. Bance, who had undertaken anatomical studies of *P.* × *suecicus* at Taylor's behest, but he clearly failed to prompt Dandy into the work needed to complete the paper on this hybrid.

The typescript of the unpublished study is marked up with corrections in Dandy's hand and some more tentative comments by Taylor. Our aim is to print it as Dandy & Taylor intended to publish it, incorporating the corrections made by Dandy. We have incorporated minor rewording without comment, but have drawn attention to some more significant changes or annotations as numbered notes. These changes show, for example, how the austere and authoritative style of the Studies was achieved by the ruthless excision of material of a more speculative nature. We have also added some other explanatory notes. We have retained the typographical conventions of the 1940s, e.g. the placement of the hybrid sign × before the generic name, to maintain conformity with the other papers in the series.

Sir George Taylor died in 1993 and his books and papers were bequeathed to the National Library of Scotland (accession no. 9533). The manuscript published here was presumably amongst them, but Taylor's manuscripts have not yet been catalogued and in any event all manuscripts held by the National Library are currently unavailable because of building work.

TEXT OF THE STUDY
The text of the study is as follows:

STUDIES OF BRITISH POTAMOGETONS. – XIX.

BY J. E. DANDY, M.A., AND G. TAYLOR, D.SC.

XIX. × *POTAMOGETON SUDERMANICUS* IN BRITAIN.

Hybrids between the "pusilloid" (linear-leaved) species of *Potamogeton* are remarkably rare when we consider the comparative frequency with which some of the broad-leaved species interbreed[1]. It is true that Hagström in his 'Critical Researches' recognized eleven hybrid combination of "pusilloid" species in Europe, but some of the plants which he treated as hybrids are without doubt only states of species; and of the British plants identified in print as "pusilloid" hybrids by Hagström, A. Bennett, and others not one is of hybrid origin. Nevertheless genuine hybrids between "pusilloid" species do occasionally occur in Britain, as elsewhere, and one of them forms the subject of the present note[2].

In working through the pondweeds of the Druce Herbarium, Oxford, we came across an unidentified specimen from the Wareham district of Dorset which might at first sight have passed for a broad-leaved state of *P. Berchtoldii* but for the obvious strong compression of the stem and the presence of a fruiting-carpel of too large size. On examining the specimen more closely we found that the leaves have, besides the usual three vascular nerves, an irregular number of fine (often broken) sclerenchymatous nerves of the type which characterizes the leaves of *P. acutifolius* and *P. compressus*. The presence of these nerves, in association with a strongly compressed stem, at once suggested a hybrid of *P. Berchtoldii* with *P. acutifolius*, which occurs in the Wareham district whereas *P. compressus* does not. Further investigation of other characters showed the plant to be in all respects intermediate between *P. acutifolius* and *P. Berchtoldii*. For example, the fruiting-carpel (the only one developed, and possibly not fertile, is midway in size and form between the two species[3]. The stipular sheaths are open and convolute as in both *P. acutifolius* and *P. Berchtoldii*. Thus the morphological evidence convinces us that the plant is a hybrid between these species, a conclusion which is supported by the fact that both have been collected in the neighbourhood of Wareham.

The plant under discussion was collected by Mr. A. W. Graveson about 1927 in the ditches of the water-meadows near Redcliff Farm[4], south-east of Wareham. In 1942, hearing that Dr. F. C. Steward intended to visit Dorset in June, we requested him to search for the plant: on being given details of the locality he succeeded in collecting a good series of specimens, though unfortunately these were not in flower[5]. In October he paid another visit to the place and obtained further specimens, again sterile but this time bearing winter-buds intermediate between those of the parent species[6].

Highly interesting as it is, this hybrid between *P. acutifolius* and *P. Berchtoldii* is not new to science. It was described from Sweden by Hagström in his 'Critical Researches', p. 73, fig. 28 A–E, under the name × *P. sudermanicus* and with the formula *P. acutifolius* × *pusillus* (his "*P. pusillus*" being *P. Berchtoldii*). Hagström's description and figures agree well with the Dorset plant except that the peduncles of the Swedish plant are given as only 6–8 mm. long as against 24 mm. in Mr. Graveson's specimen, while the spikes are described as entirely barren whereas, as we have already mentioned, a single fruiting-carpel is present in the material from Dorset. This solitary fruiting-carpel may, however, be a chance development such as we have observed occasionally in such sterile hybrids as × *P. fluitans*, × *P. nitens*, and × *P. sparganifolius*[7]. The longer peduncles of the Dorset plant is also without significance as its length comes well within the limits of variation to be expected from the character of the parent species.

× *P. sudermanicus* was named after Sudermania, in Sweden, where the type was collected in 1831. The type-locality, as Hagström remarked in describing the hybrid, is at the most northern border of the distribution area of *P. acutifolius*. He added that the plant probably belongs to the greatest rarities of the vegetable kingdom, and this may well be true despite the discovery of the Dorset station[8].

Mr. Graveson's specimen apparently ranks as the first authentic record of × *P. sudermanicus* from the British Isles, an earlier record for East Sussex being an error[9]. The Sussex plant, which was collected near Camber Castle, Icklesham, by C. E. Salmon in 1900, is quite normal *P. pusillus*, and its

treatment as × *P. sudermanicus* by Bennett in Journ. Bot. lx. 55 (1922) is inexplicable as its stipular sheaths are of course tubular, whereas those of × *P. sudermanicus* and both its parent species are open. This erroneous record of × *P. sudermanicus* has been repeated in other works including the 'London Catalogue', Ed. 11 (1925), p. 46; Druce's 'British Plant List', Ed. 2 (1928), p. 117; and Wolley-Dod's 'Flora of Sussex' (1937), p. 465. It was referred by us to *P. pusillus* in our note on that species (Journ. Bot. lxxviii. 5) in 1940.

Following is the brief synonymy and distribution of × *P. sudermanicus* as a British plant.

P. ACUTIFOLIUS × BERCHTOLDII =
× P. SUDERMANICUS Hagstr. Crit. Res. 73, fig. 28 A–E (1916)[10].
P. acutifolius × *pusillus* Hagstr. op. cit. 73 (1916).

We have seen specimens from only one vice-county:–
(9) DORSET. Ditches in water-meadows near Redcliff Farm, Arne, c.1927, *A. W. Graveson*, Ref. 5 (Herb. Druce); June and Oct. 1942, *F. C. Steward* (Herb. Brit. Mus.).

NOTES

1. The sentence "The reason may well be that the "pusilloid" species depend more on vegetative winter-buds than on seeds for their reproduction." and Taylor's addition "and many are shy flowerers" follow this sentence but have been enclosed in square brackets, apparently to denote that they should be deleted.

The following paragraph, in Taylor's handwriting, is attached to the copy of the *P.* × *sudermanicus* typescript and also deals with this issue; it is not clear where, if anywhere, Taylor intended it to be inserted.

"[It is not] easy to understand why there should be apparent antipathy between closely allied species which grow in close association and in such circumstances frequently produce an abundance of fruit. Whether these fruits are viable or not is a matter for experiment or observation in the field but, in addition to possible increase by germination, the pusilloid species always provide for perpetuation by vegetative means: Fernald, indeed, has suggested that winter buds "are the usual, if not the only, means of reproduction". As the plants mature, whether they have fruited or not, they invariably produce winter-buds. In many situations pusilloid species are shy in[?] flowering and depend on vegetative propagules for their survival."

The first words in the paragraph are illegible on my photocopy and the material in square brackets is my interpolation. Taylor's quotation is taken from Fernald (1932, p. 21).

2. The other British pusilloid hybrids are *P. acutifolius* × *friesii*, described as *P.* × *pseudofriesii* by Dandy & Taylor (1957), and *P. pusillus* × *trichoides*, described as *P.* × *grovesii* by Dandy & Taylor in Sell (1967).

3. Dandy had marked this sentence by a line in the margin and added a question mark.

4. The spelling Redcliff was the norm when Dandy & Taylor wrote, although Redcliffe appears on modern maps.

5. The phrase "In 1942" originally appeared as "This year" and then as "Last summer". The phrase "On being given details of the locality..." replaces "He responded with enthusiasm, and having obtained details of the locality from Mr. Graveson...".

6. This sentence is a manuscript addition in Dandy's hand.

7. The first half of this and the second half of the preceding sentence have been marked with a double line in the margin and Taylor has commented "? Simpson's specimen". This presumably refers to a specimen of *P.* × *sudermanicus* collected by N. D. Simpson on 27 June 1945 and now in **BM** which also bears an enlarged carpel. The occasional development of swollen carpels resembling immature fruits is a feature of the Wareham population of *P.* × *sudermanicus* (Preston 1995b).

8. For a summary of subsequent records of *P.* × *sudermanicus* in Europe, see Ploeg (1987). The hybrid has been recorded from England, the Netherlands and Sweden; a more tentative report from Germany requires confirmation.

9. In 1973 Dandy determined as *P.* × *sudermanicus* a specimen collected as *P. acutifolius* from Stoborough Meads by J. H. Salter in 1920 or 1921 (**NMW**), which predates Graveson's specimen.

10. The reference is to Hagström (1916).

MORPHOLOGY OF *P.* × *SUDERMANICUS*

A description and illustration of *P.* × *sudermanicus*, based on studies of living plants and herbarium material from the Wareham population, has already been published (Preston 1995b) and need not be repeated here. Two aspects can, however, be elaborated. In studies of the living plant it became clear that the compression of the stems of the hybrid forms a useful quantitative character to distinguish it from both *P. acutifolius* (which has strongly compressed to flattened stems) and *P. berchtoldii* (which has terete to slightly compressed stems). This conclusion was based on measurements of the longest and shortest axes of the stems of all three species in cross section. These data are summarised in Table 1 and illustrated in Fig. 1. The hybrid is also intermediate in floral characters between *P. acutifolius* (which usually has one carpel per flower) and *P. berchtoldii* (which usually has 4–5), as demonstrated by the data in Table 2. *P. compressus*, which is closely related to *P. acutifolius*, usually has two carpels

TABLE 1. COMPRESSION OF STEMS OF *POTAMOGETON ACUTIFOLIUS*, *P. BERCHTOLDII* AND THEIR HYBRID *P.* × *SUDERMANICUS*

Taxon	Number of stems examined	Stem compression	
		Mean	Range
P. acutifolius	25	3·8	2·8–4·7
P. × *sudermanicus*	43	2·0	1·6–2·4
P. berchtoldii	32	1·4	1·0–1·6

Stem compression is the ratio of the longest to the shortest axis of the stem in cross-section, measured on fresh plants. Based on material of *P. acutifolius* from Dorset, Norfolk and Sussex, *P. berchtoldii* from a range of sites in the British Isles and *P.* × *sudermanicus* from Dorset.

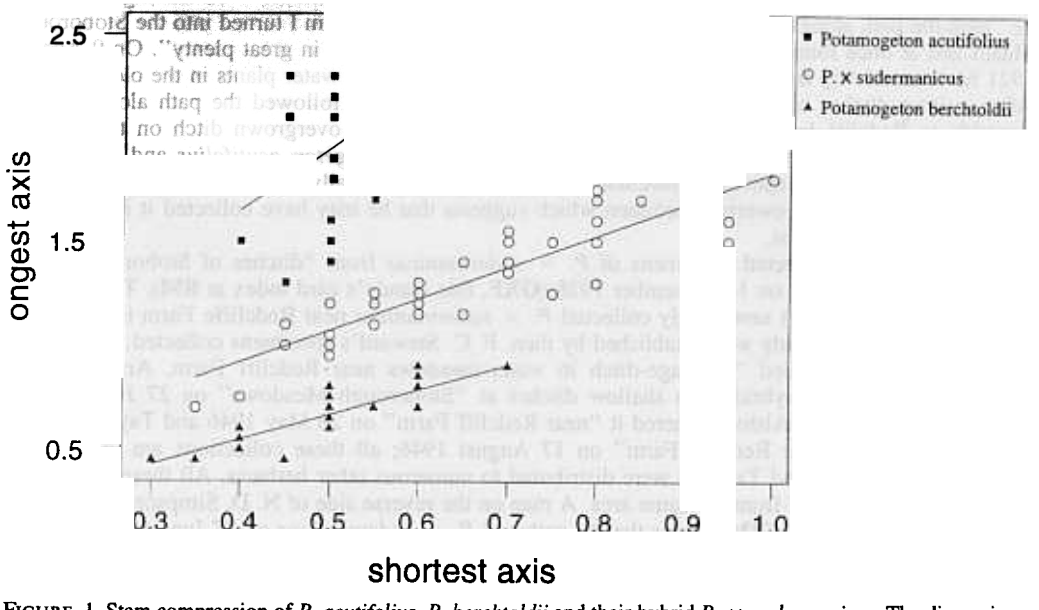

FIGURE. 1. Stem compression of *P. acutifolius*, *P. berchtoldii* and their hybrid *P.* × *sudermanicus*. The dimensions of the longest and shortest axes of the fresh stems (mm) were measured in cross sections of fresh material of *P. acutifolius* from Dorset, Norfolk and Sussex, *P. berchtoldii* from a range of sites in the British Isles and *P.* × *sudermanicus* from Dorset. Regression lines are shown for *P. acutifolius* ($r^2 = 0{\cdot}26$), *P.* × *sudermanicus* ($r^2 = 0{\cdot}78$) and *P. berchtoldii* ($r^2 = 0{\cdot}77$).

TABLE 2. NUMBER OF CARPELS IN THE FLOWERS OF *POTAMOGETON ACUTIFOLIUS*, *P. BERCHTOLDII* AND THEIR HYBRID *P.* × *SUDERMANICUS*

Taxon	Number of flowers examined	Number of carpels per flower						
		1	2	3	4	5	6	7
P. acutifolius	19	19	0	0	0	0	0	0
P. × *sudermanicus*	59	12	36	10	1	0	0	0
P. berchtoldii	89	0	0	6	64	16	2	

Based on material of *P. acutifolius* from Dorset and Norfolk, *P. berchtoldii* from a range of sites in the British Isles and *P.* × *sudermanicus* from Dorset. The data for *P.* × *sudermanicus* exclude one malformed flower with four carpels and eight stamens.

per flower, though a minority of flowers have one (Charlton & Posluszny 1991). The presence in *P.* × *sudermanicus* of a substantial minority of flowers with a single carpel perhaps provides morphological evidence for the fact that *P. acutifolius* rather than *P. compressus* is one parent, and thus supports a conclusion reached by Dandy & Taylor on geographical grounds alone.

DISTRIBUTION OF *P.* × *SUDERMANICUS* AND ITS PARENTS IN DORSE

All records of *P.* × *sudermanicus* in Britain are from ditches in grazing marshes by the River Frome south of Wareham. The earliest known specimen was collected from "Stoborough Meads, Wareham" by J. H. Salter (**NMW**). Salter's natural history diaries, now in the National Library of Wales at Aberystwyth (NLW MS 14444B), throw some light on the discovery of the hybrid. Salter visited Wareham on 6 September 1920, "with a special view to the old marsh ditches". On leaving Wareham, he "took the path alongside the river for Redcliff. Close to Redcliff Farm I turned into the Stoborough Meads and at once found the long-looked-for *Potamogeton acutifolius* in great plenty". On 9 August 1921 he returned "by first train to Wareham to have a good hunt for water plants in the old ditches". After visiting ditches north of the town he made for Ridge. "As I followed the path alongside the riverside to Redcliff I saw plenty more *Juncus obtusifolius* in the overgrown ditch on the right. I diverged into the meadows, but this time saw only a little *Potamogeton acutifolius* and that not in flower or fruit." Salter's specimen, labelled "*P. acutifolius*" but actually *P.* × *sudermanicus*, is dated 1921. It is, however, a flowering specimen which suggests that he may have collected it in 1920, the year he first saw the plant.

A. W. Graveson collected specimens of *P.* × *sudermanicus* from "ditches of Stoborough water meadows near Redcliff" on 14 September 1928 (**OXF**, fide Dandy's card index at **BM**). The fact that both Salter and Graveson unwittingly collected *P.* × *sudermanicus* near Redcliffe Farm in the 1920s suggests that it was already well established by then. F. C. Steward's specimens collected in June and October 1942 are labelled "drainage-ditch in water-meadows near Redcliff Farm, Arne". N. D. Simpson collected the hybrid from shallow ditches at "Stoborough Meadows" on 27 June and 31 October 1945, A. H. G. Alston gathered it "near Redcliff Farm" on 26 May 1946 and Taylor made a copious collection "near Redcliff Farm" on 17 August 1946; all these collections are in **BM** but duplicates of Alston's and Taylor's were distributed to numerous other herbaria. All these specimens may have been collected from the same area. A map on the reverse side of N. D. Simpson's collecting stub for collection *45050* (**BM**) shows that he gathered *P.* × *sudermanicus* on 27 June 1945 from the straight ditch running west from Redcliffe Farm; he had collected *P. acutifolius* on 5 June 1945 from another ditch in this area west of the Farm. Writing to J. E. Dandy on 2 August 1945, Mrs W. B. Watt also described a site for *P.* × *sudermanicus* which must lie west of the Farm and south of the River Frome. This area is also shown on a map tipped into the *P.* × *sudermanicus* pages of G. Taylor's typescript of the monograph of *Potamogeton* he drafted with Dandy. It seems likely that all the early collections of the hybrid were made in the area west of Redcliffe Farm, where it still grows with *P. acutifolius* (Fig. 2).

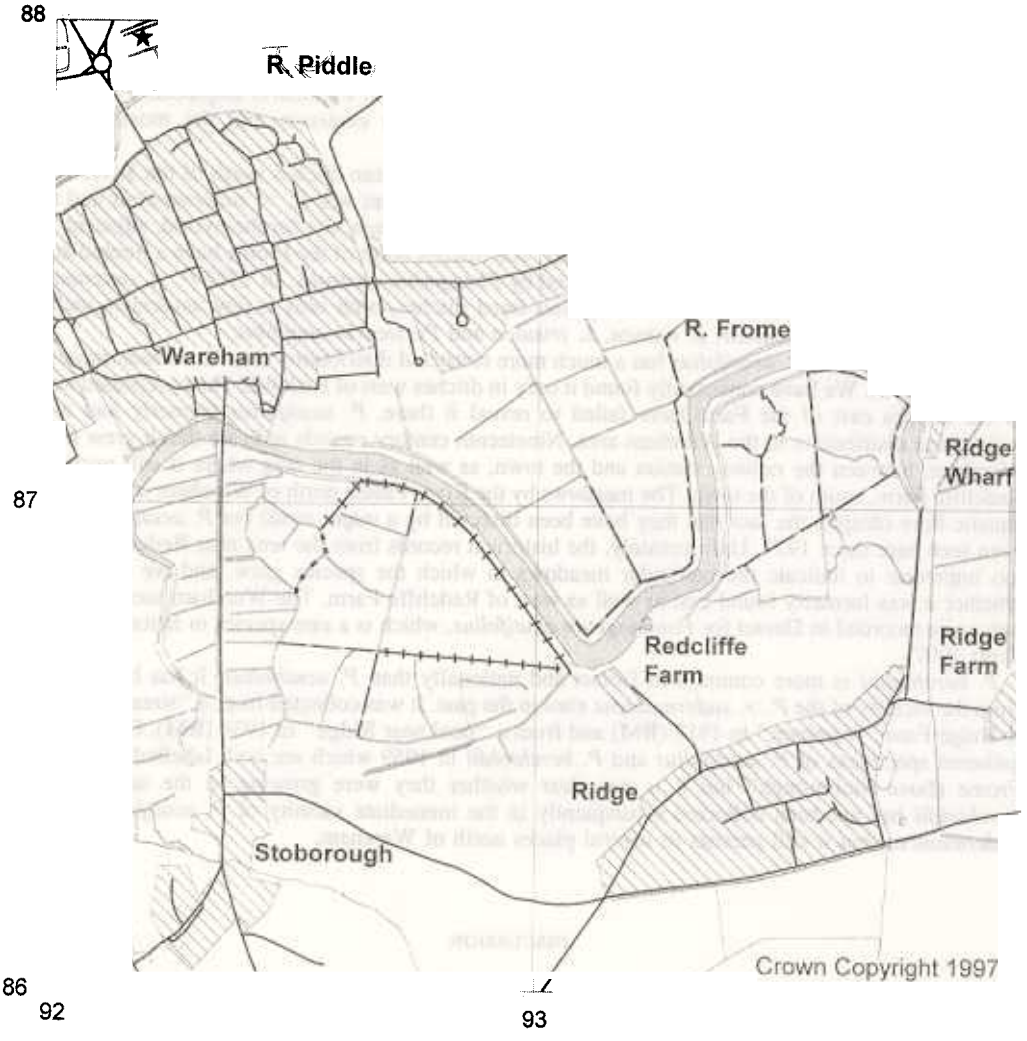

FIGURE. 2. The distribution of *P. acutifolius*, *P. berchtoldii* and their hybrid *P.* × *sudermanicus* in the area south-east of Wareham, as recorded between 1987 and 1997. Ditches in which *P. acutifolius* has been recorded in the absence of *P.* × *sudermanicus* are shown by short dashes (- - - - - -), those in which *P. acutifolius* and *P.* × *sudermanicus* have been recorded are shown by a hatched line (-+-+-+-) and those in which *P.* × *sudermanicus* has been recorded in the absence of *P. acutifolius* are shown by long dashes (— — —). The only locality for *P. berchtoldii* is denoted by a star (★). The grid lines are 1 km apart and the relevant eastings and northings are shown; the entire area lies within 10-km square SY/9.8.

Fieldwork between 1987 and 1997 has established that *P.* × *sudermanicus* can usually be found both west and east of Redcliffe Farm south of the River Frome (Fig. 2). It grows in water 25–75 cm deep and of pH 7–8 in grazing marsh ditches. Like many aquatics, it may vary in quantity from year-to-year and it is sometimes abundant, especially in the meadows east of Redcliffe Farm. It may be the most numerous macrophyte in some lengths of ditch, either occurring as dense masses in well-vegetated areas or as scattered plants on the rather open substrate of ditches cleared out the previous year. Interestingly, specimens collected by N. D. Simpson on 31 October 1945 were "growing up out of the mud after partial clearing of the ditches". *P.* × *sudermanicus* may grow in smaller quantity, sometimes as scattered plants amongst dense populations of *Elodea canadensis*, and it persists in shaded water

amongst dense stands of *Phragmites australis*. It often grows with *Callitriche* sp., *Eleogiton fluitans*, *Elodea canadensis*, *E. nuttallii*, *Lemna minor*, *L. trisulca*, *Potamogeton natans* and *Spirodela polyrhiza*; less frequent associates include *Alisma plantago-aquatica*, *Glyceria fluitans*, *Hydrocotyle vulgaris*, the aquatic variant of *Juncus bulbosus*, *Mentha aquatica*, *Persicaria amphibia*, *Potamogeton acutifolius*, *P. pectinatus*, *Ranunculus flammula*, *Sparganium emersum* and the moss *Fontinalis antipyretica*.

In 1996 Bryan Pickess reported a narrow-leaved pondweed from ditches north of the River Frome. Exploration of the site, an R.S.P.B. reserve, revealed that the plant was *P.* × *sudermanicus* and that it was widespread but not abundant in this area. This represents a new site for the hybrid, adjacent to the known sites but separated from them by the river. The ditches north of the Frome have a limited aquatic flora, and in many places they are almost choked by *Phragmites australis*. In 1997 *P.* × *sudermanicus* grew in the more open areas of the *Phragmites*-lined ditches, with only a few associates including *Elodea nuttallii*, *Lemna minor*, *L. minuta*, *L. trisulca* and *Persicaria amphibia*.

The putative parent *P. acutifolius* has a much more restricted distribution than *P.* × *sudermanicus* in the area (Fig. 2). We have consistently found it only in ditches west of Redcliffe Farm; repeated surveys of the ditches east of the Farm have failed to reveal it there. *P. acutifolius* formerly had a more widespread distribution in the Wareham area. Nineteenth century records indicate that it grew north of Wareham, between the railway station and the town, as well as in the area where it still occurs near Redcliffe Farm, south of the town. The meadows by the River Piddle north of Wareham still have a rich aquatic flora (despite the fact that they have been bisected by a major road) but *P. acutifolius* has not been seen here since 1921. Unfortunately, the historical records from the area near Redcliffe Farm are too imprecise to indicate the particular meadows in which the species grew, and we do not know whether it was formerly found east as well as west of Redcliffe Farm. The Wareham localities are the only ones recorded in Dorset for *Potamogeton acutifolius*, which is a rare species in Britain (Preston & Croft 1997).

P. berchtoldii is more common in Dorset and nationally than *P. acutifolius*. It has been recorded from the vicinity of the *P.* × *sudermanicus* sites in the past. It was collected from a "stream on the way to Ridge Farm, Wareham" in 1917 (**BM**) and from a "pool near Ridge" in 1934 (**BM**). D. A. Cadbury gathered specimens of *P. acutifolius* and *P. berchtoldii* in 1959 which are both labelled "ditch by R. Frome above Stoborough" but it is not clear whether they were growing in the same ditch. *P. berchtoldii* has not been collected subsequently in the immediate vicinity of *P. acutifolius* or *P.* × *sudermanicus*, but it still persists in several places north of Wareham.

DISCUSSION

The presence of *Potamogeton* × *sudermanicus* in the Wareham area since 1920 or 1921, when it was first collected by J. H. Salter, is a striking example of the local persistence of *Potamogeton* hybrids. It is particularly noteworthy that it has persisted in grazing marsh ditches. In this respect its history provides a contrast with *P.* × *lanceolatus* Sm., the hybrid between *P. coloratus* Hornem. and *P. berchtoldii*. This hybrid failed to persist in a ditch in Cambridgeshire where it was recorded once, in 1880, but has survived since the 19th century in three streams in western Ireland. Preston (1993) argued that as a sterile hybrid it might be more likely to persist in the open habitats provided along the beds of a stream or small river than in a ditch, where it could be eliminated by competition from emergent species during phases when the ditch becomes overgrown. Postcards of Wareham taken from Redcliffe which were published by the Dorset firm of Delpool in 1984 and 1987 (numbers WM-3 and WM-3(R)) show that the ditches in which *P.* × *sudermanicus* grows north of the river Frome and which are now narrow and colonised by abundant *Phragmites australis* have been broad and open in the past. The Dorset population of *P.* × *sudermanicus* is presumably dependent for its survival on the occasional clearing of the ditches in which it grows.

Another noteworthy feature of the distribution of the hybrid is that for much of its Dorset range it is present in the absence of both parents. It seems likely that the hybrid arose in a ditch where both parents grew at Wareham, rather than arriving by long-distance dispersal of pollen or seed. *P. berchtoldii* formerly grew in the Redcliffe Farm area although it has not been found there in recent years. It is possible that *P.* × *sudermanicus* first arose in the area where it still grows with *P. acutifolius* west of

Redcliffe Farm and attained its current distribution by spreading to the ditches east of the Farm and north of the River Frome. Another possibility is that *P. acutifolius* formerly grew in the ditches now occupied by the hybrid alone, but has contracted in distribution. In this case *P.* × *sudermanicus* might have arisen anywhere in this area, or indeed in more than one locality. Evidence from molecular studies, such as that obtained for the other rare Dorset *Potamogeton* hybrid, *P.* × *schreberi*, by Hollingsworth *et al.* (1995), might establish the relationship of *P.* × *sudermanicus* to the *P. acutifolius* plants currently present at Wareham and determine whether the hybrid is represented by one or more clones. Although it is clear that *P.* × *sudermanicus* normally reproduces vegetatively by turions, it would also be interesting to know whether the small fruits produced by occasional flowers of the hybrid are ever capable of germination.

Occasionally, *Potamogeton* hybrids may be found at sites where both parents are absent. *P. acutifolius* not only has a very restricted distribution in the Wareham area but is also much less frequent in those ditches where it does occur than it is at some sites in Sussex where it is present in abundance (Preston & Croft 1997). This suggests that we may be witnessing a late stage in the process by which a hybrid which has become established in the vicinity of its parents is then left alone following the disappearance of both parents from the locality.

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