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CONIDIA OF *ACROSPERMUM COMPRESSUM* AND *A. GRAMINUM*

BY JOHN WEBSTER

Botany Department, University of Sheffield

(With 2 Text-figures)

Acrospermum compressum and *A. graminum*, which have earlier been considered as synonyms, produce different types of conidial apparatus in culture. *A. compressum* forms two-celled conidia, whilst *A. graminum* forms unicellular conidia.

Acrospermum compressum Tode ex Fr. and *A. graminum* Lib. show characteristic differences when grown in culture. The two species have, however, been regarded as one. Rehm (1896), Riddle (1920) and Brandriff (1936) regarded *A. graminum* as a variety of *A. compressum*. This view is based on the similarity of fruit-bodies of the two species, but no cultural evidence was put forward to support it, although Brandriff grew *A. compressum*. She states that 'after three weeks fruiting structures developed. These had the appearance of spermogonia or very small pycnidia. They were provided with short beaks, and contained minute unicellular bodies of the aspect of spermatia.' No drawings or measurements of these structures were given. Cultures from recent British collections differ from those described by Brandriff.

ACROSPERMUM COMPRESSUM

Isolations of *A. compressum* have been made from the following five collections:

Herb. University Sheffield number	Host	Locality	Date
1178	*Urtica dioica*	Howldale, Pickering, Yorks. Coll. W. G. Bramley	13. vi. 54
1643*a*	*U. dioica*	Middle marsh, Wheatfen Broad, Surlingham, Norfolk	12. iv. 55
1647	*U. dioica*	Lowdales, Hackness, Yorks	16. iv. 55
1648	*Galium aparine*	Lowdales, Hackness, Yorks	16. iv. 55
1649	*Urtica dioica*	Forge Valley, Yorks.	15. iv. 55

Isolations from all these collections produced a similar type of growth in culture and the description below is based on specimen no. 1643*a*.

Fruit-bodies (Fig. 1 A): single or in groups, club-shaped to cylindrical, slightly compressed, pointed, pale yellow to brown and somewhat translucent when moist, darker on drying, usually 2–3 mm. high and 200–400 μ broad. The wall of the fruit-body is about 50–60 μ thick, composed of parallel narrow hyphae, turning outwards and expanding at their tips to form a pseudoparenchymatous outer layer of brown polygonal cells

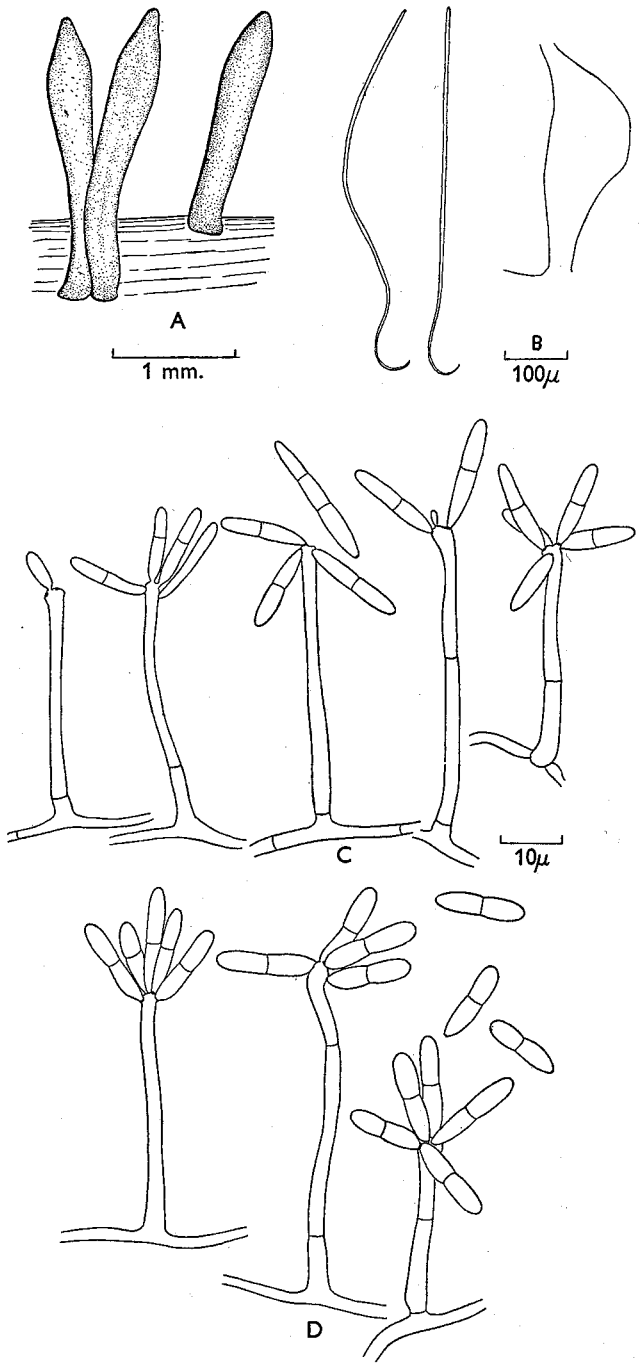

Fig. 1. *Acrospermum compressum*. A, B, C from Herb. University Sheffield, no. 1643*a*; D from 1178. A, fruit-bodies on *Urtica* stem; B, asci and ascospores; C, conidia from a single ascospore culture, 14 days old on maize-extract agar; D, conidia from a similar culture derived from Herb. no. 1178.

about 10 μ wide. *Asci* (Fig. 1 B): confined to the wider upper part of the fruit-body, fasciculate, narrowly cylindrical, up to 500 μ long, 3–4 μ wide, separated by numerous filiform paraphyses. *Ascospores*: 8, filiform, hyaline, almost as long as the asci, about 0·5 μ wide.

This specimen has been matched with Schmidt and Kunze Exsiccatum no. 69, also on *Urtica dioica*, which was one of the exsiccati cited by Fries (1822).

Cultures. From a suspension of crushed asci, single ascospore and single ascus cultures were prepared. On maize-extract agar the fungus grew slowly, forming flat whitish colonies. The hyphae were at first confined to the medium, 1–3 μ wide, often forming characteristic coiled skeins. Later aerial hyphae were produced, and these bore conidiophores within 10–14 days of inoculation. The conidiophores were mostly unbranched and consisted of pale yellow upright hyphae 20–80 μ long, 3–4 μ wide at the base, tapering to 2 μ near the apex. The tip of the conidiophore bore a radiate group of cylindrical conidia, and up to fifteen conidia have been counted on a single head (Fig. 1 C, D). The first conidium arises as the blown-out tip of the conidiophore. Subsequent conidia are formed close to it (probably acrogenously) so that a close crown of conidia arises. When a conidium is detached an inconspicuous flattened scar is visible at the conidiophore apex. Mature conidia are pale yellow in mass, cylindrical to club-shaped, tapering to a flattened scar below, rounded above, usually with a single median transverse septum, slightly constricted. Occasional 2- to 3-septate spores were found, and in old cultures the individual cells of the spores were often inflated. The ranges in size of the conidia from the five collections were: 1178, 10–20 × 3–4 μ; 1643*a*, 13–23 × 2·5–3 μ; 1647, 12–30 × 3–4 μ; 1648, 12–18 × 2·5–3 μ; 1649, 8–18 × 3–4 μ.

Acrospermum graminum

Isolations of *Acrospermum graminum* have been made from the following four collections:

Herb. University Sheffield number	Host	Locality	Date
365	Wheat stems	Bolton Percy, Yorks. Coll. W. G. Bramley	1. v. 50
1055	*Deschampsia caespitosa*	Fulwood, near Sheffield	5. vi. 51
799	*Agropyron repens*	Kilnsea, E. Yorks	21. vii. 49
1644	*Phragmites communis*	Home Marsh, Wheatfen Broad, Surlingham, Norfolk	12. iv. 55

All isolates produced similar growth in culture. The following description is based on specimen no. 365.

Fruit-bodies (Fig. 2 A): club-shaped, 1–1·2 mm. high and 200–300 μ wide, yellow to brown in colour, single or in groups of two to four, seated on a broader base and bursting through the epidermis of the leaf sheath, rounded or pointed at the apex, slightly flattened above, collapsing on drying to form shallow furrows. The wall of the fruit-body is made up of narrow parallel, interwoven hyphae, turning outwards to form rounded or polygonal yellowish brown cells about 6 μ wide. *Asci*: fasciculate,

narrowly cylindrical, tapering at the base and rounded above, 400–600 μ long, 4–6 μ wide, separated by filiform paraphyses. *Ascospores*: 8, filiform, hyaline, about as long as the asci, 0·5 μ wide.

The specimen has been matched with Libert's Pl. Crypt. Arduen. no. 33.

Cultures. Six cultures were prepared from ascospores and asci. The asci and ascospores germinated readily and were transferred to a variety

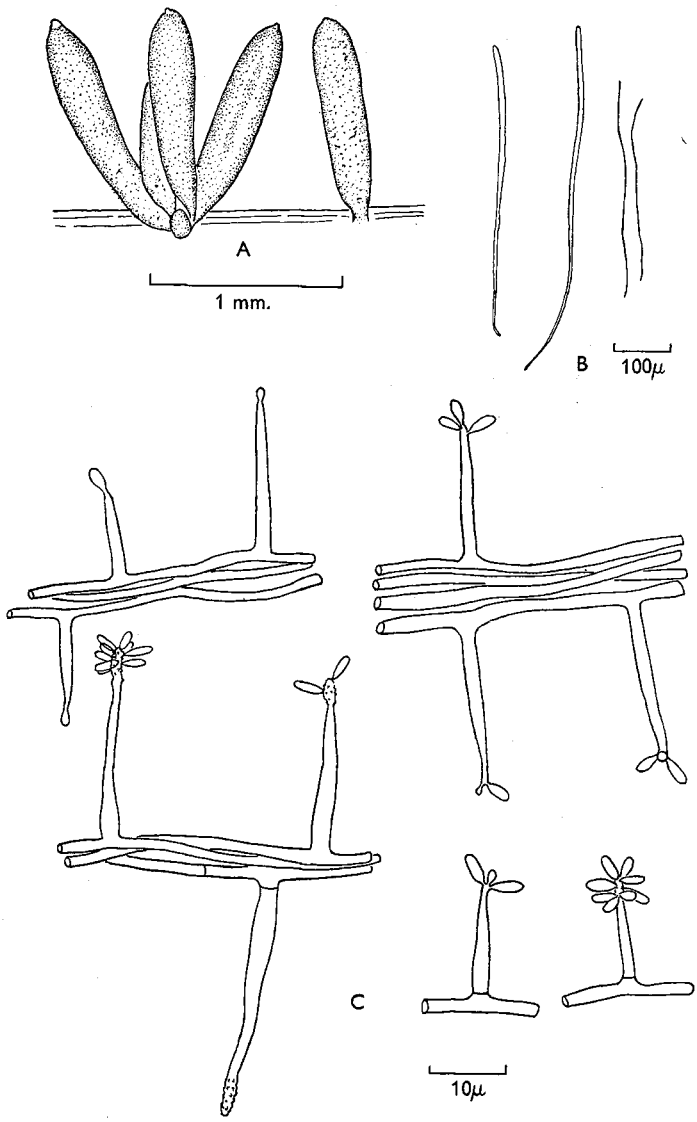

Fig. 2. *Acrospermum graminum*. Herb. University Sheffield no. 365. A, fruit-bodies on wheat stems; B, asci and ascospores; C, conidia from single ascospore culture, 14 days old on maize-extract agar.

of agar media. The fungus grew rather slowly, producing regular circular colonies with a submerged cream-coloured mycelium, and an aerial growth which was faintly green in colour, forming rope-like strands. Within 10 days conidia were produced on short conidiophores projecting from the rope-like strands of aerial mycelium or from the submerged mycelium. Conidia were produced in all cultures, including one derived from a single ascospore and one from a single ascus. The conidiophores are tapering and unbranched and occasionally bear a septum at the base, are 15–16 μ long × 2·5–4 μ wide at the base tapering to 1·5–2 μ at the apex. The first formed conidium is produced terminally as a cylindrical swelling at the tip of the conidiophore and is displaced laterally by the formation of a second growing point, which grows beyond the first formed conidium and produces a second conidium. This process is repeated so that an 'ear' of conidia is formed. Eventually in culture, hundreds of conidia may be formed in a single head. When conidia are displaced a series of small peg-like scars can be observed on the conidiophore (Fig. 2 C). The conidia are hyaline, cylindrical or elliptical, and measure 3–6 × 1·5–2·5 μ (mostly 4 × 1·5 μ). Similar conidiophores and conidia have also been found developing from the wall of the fruit-body, after incubation in a damp-chamber.

No appreciable difference has been detected in the growth and dimensions of the other isolates. In addition to these isolates, the fungus has been isolated repeatedly from the washed fragments of upper internodes of standing stems of *Agropyron repens*, collected at Lindrick Common, near Worksop by Mr H. J. Hudson and from fragments of standing stems of *Dactylis glomerata*.

Zogg (1950) records isolating *Acrospermum compressum* var. *graminum* from cereals, but does not describe his isolates.

Discussion

Comparison of over fifty collections of *Acrospermum* on herbaceous stems and grasses from Herb. Kew. showed great variation in size and shape. However, the height of fruit-bodies in collections on grasses rarely exceeds 1·5 mm., whilst on herbaceous stems they are frequently larger, often up to 3 mm. The similarity of fruit-bodies on the two types of host has doubtless led earlier investigators to regard them as representing a single species. However, the differences in conidial apparatus suggest that they should be regarded as separate species. It would be of interest to study isolates of *Acrospermum* on hosts such as *Typha* and *Carex*, on which it is known to occur, to see which species is present. *A. foliicolum* Berk., which grows on leaves of deciduous trees in the Southern states of North America, resembles *A. compressum*, and Riddle (1920) has regarded it as a variety of the latter. It would be of interest to study isolates of this fungus.

The discrepancy between Brandriff's description of conidia of *A. compressum* and the present isolates is puzzling. In none of the British isolates has pycnidia been observed, although the fungus has been kept in culture for several months. I have examined Brandriff's collections and slides. Her collections on *Caltha* are more robust than those on grasses and sedges,

and it seems to me probable that the former should be ascribed to *A. compressum* and the latter to *A. graminum*.

The taxonomic position of *Acrospermum* has puzzled most authorities. Rehm (1896) has reviewed earlier dispositions of the genus. Saccardo (1883) classified it with the Hysteriaceae-Scolecosporae, dividing the group into two series: (A) Genuinae and (B) Desciscentes (lit. degenerate, spurious), placing *Acrospermum* in the latter group. Rehm himself erected the group Pseudohysterineae for the genus. Brandriff (1936) also indicated relationship to the Hysteriales. Luttrell (1955) places the genus in the Coryneliales, but suggests that it should possibly be considered 'as a partially reduced perithecial form and placed in the vicinity of the Clavicipitaceae'. However, the asci of *Acrospermum* do not possess the characteristic apical apparatus found in *Claviceps*, and a satisfactory disposition of the genus is still awaited.

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