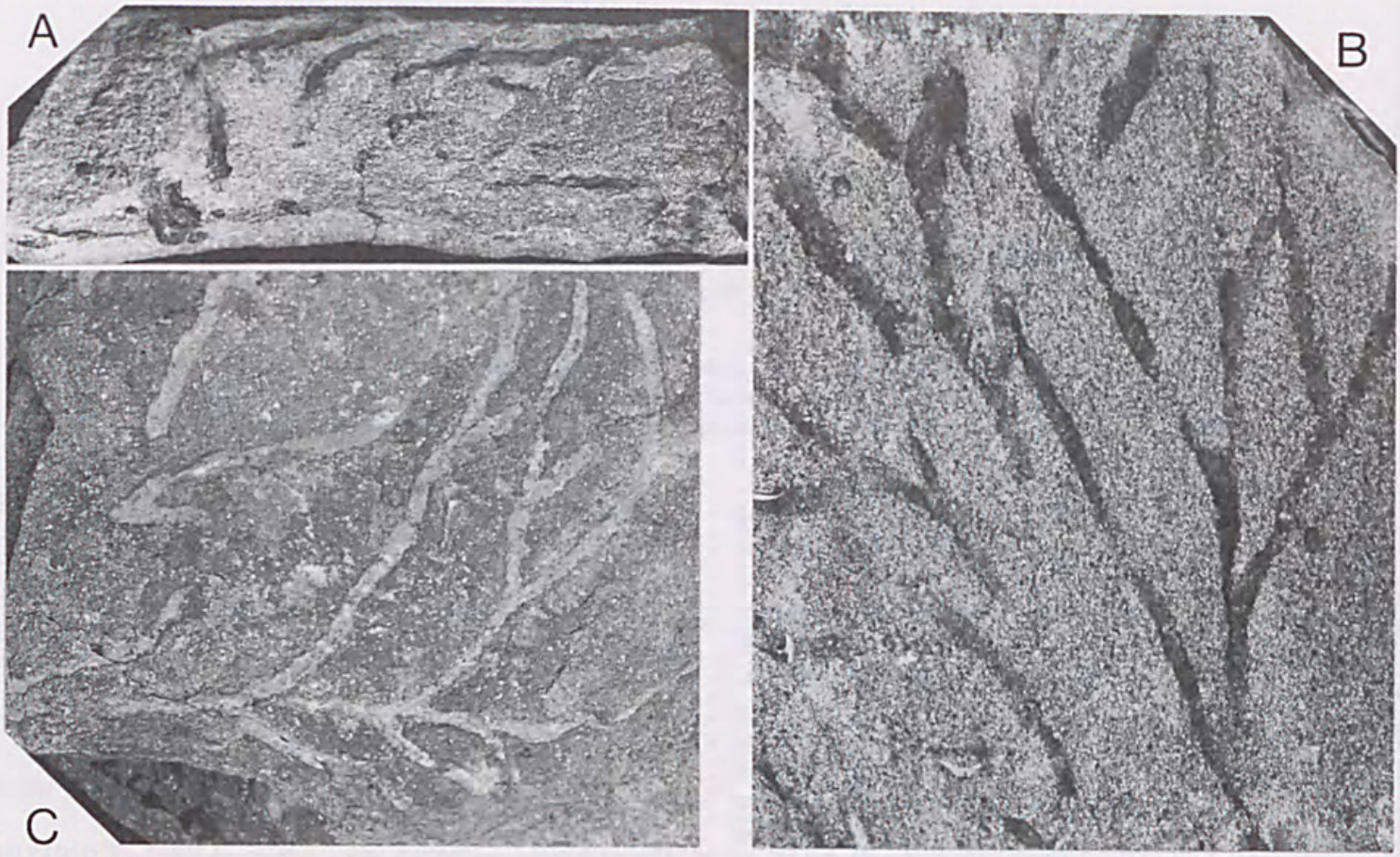

Fig. 1—Horizontal burrows forming structures that resemble *Buthotrephis*. A, B, lateral (bedding planes across page) and planar views respectively, of specimen from Dargile Formation showing darker burrows crossing bedding planes X 1. C, planar view of specimen described by Chapman (1903) as *Buthotrephis tenuis* Hall 1852, NMVP2979, X1.

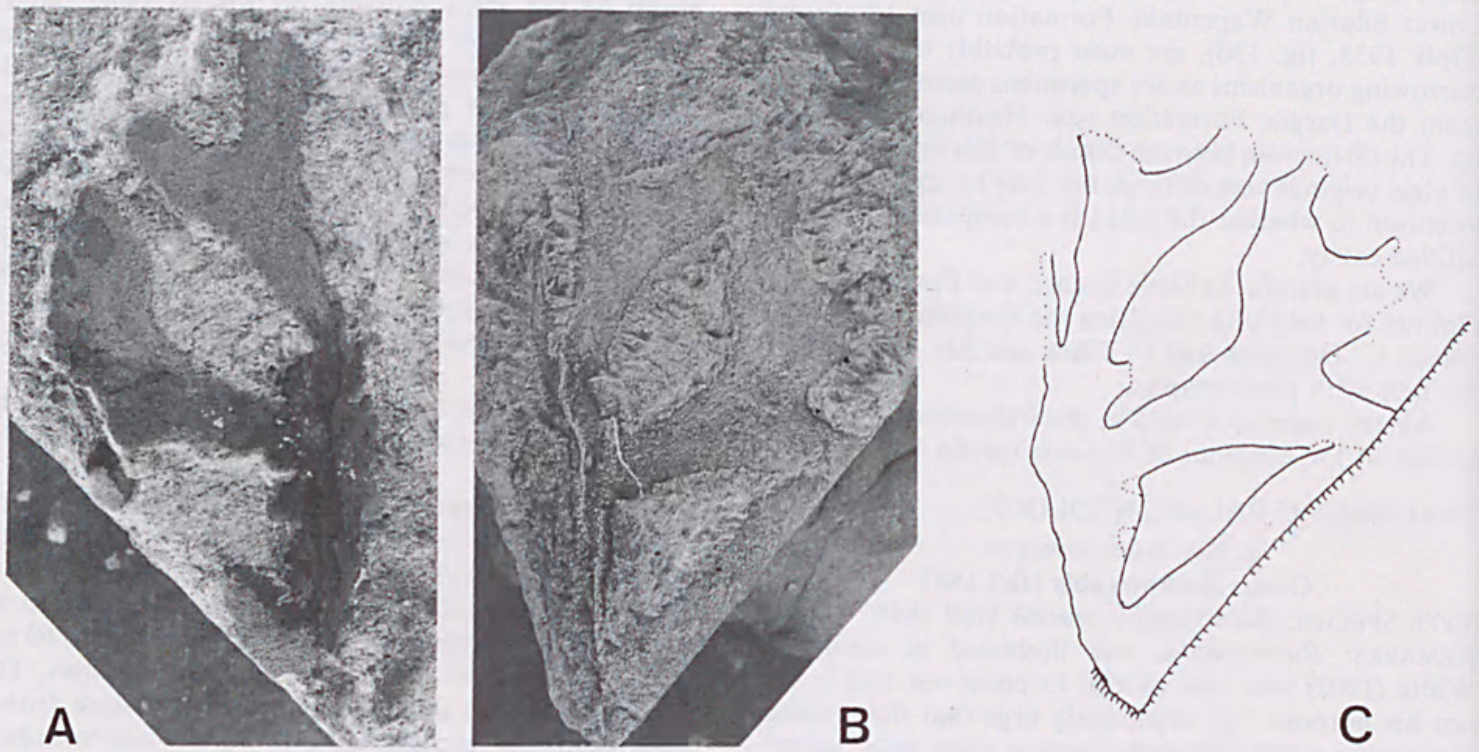

Fig. 2—*Buthotrephis trichotoma* sp. nov. NMVP107498, X1.8. A, different iron minerals produce the different colours on the fossil. B, counterpart, whitened with ammonium chloride to show the crumpled longitudinal ridges in vertical stem. C, sketch of B to show branching pattern; broken edges of fossil denoted by dotted lines, feathered line is edge of specimen.

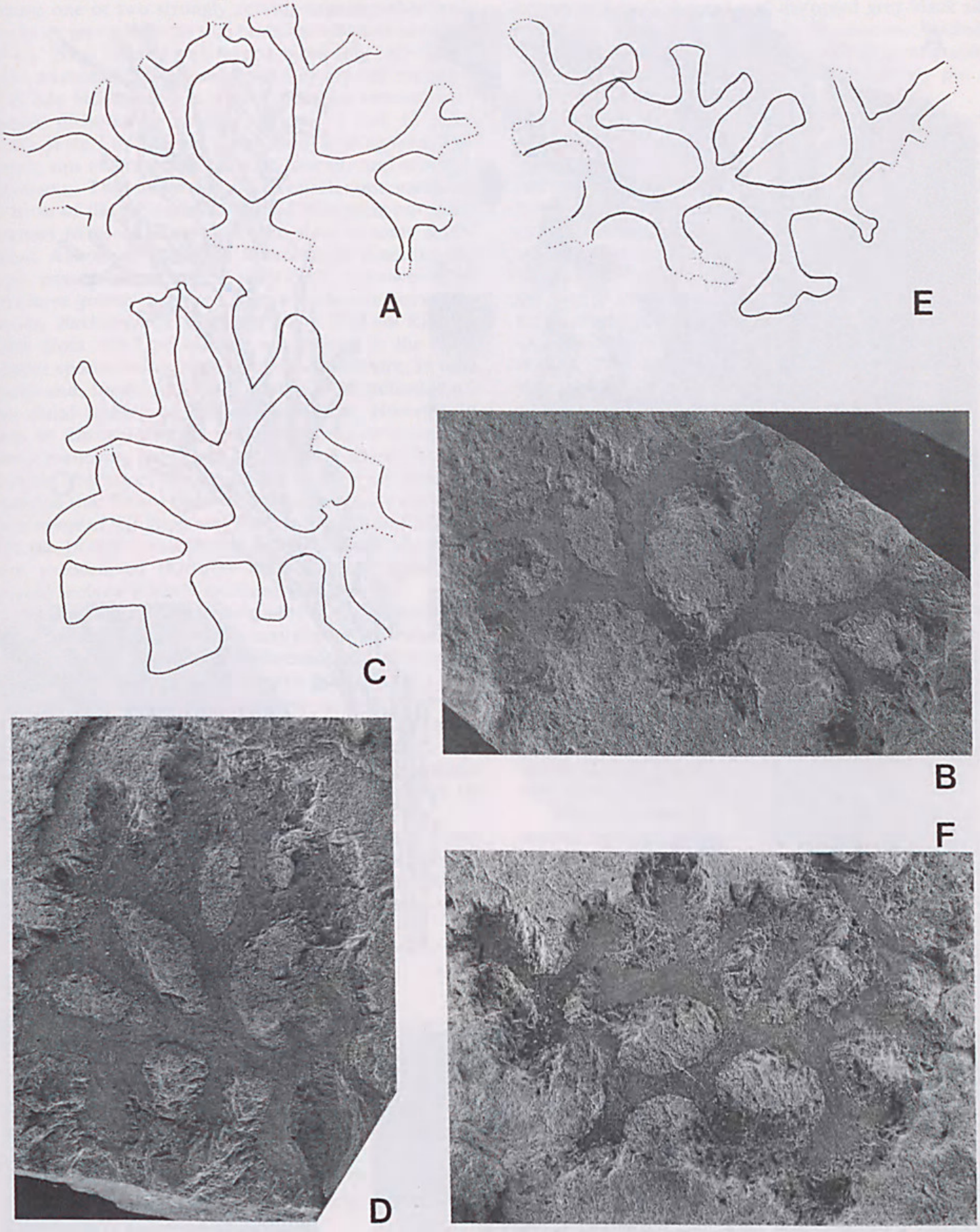

Fig. 3—*Buthotrephis trichotoma* sp. nov. A, B, NMVP107494, outline sketch and unwhitened view respectively; dotted lines indicated broken edges of specimen, X 1.2. C, D, NMVP107499, outline sketch and unwhitened view respectively X 1.2, E, F, NMVP107493, holotype, outline sketch and unwhitened view respectively, X 1.2

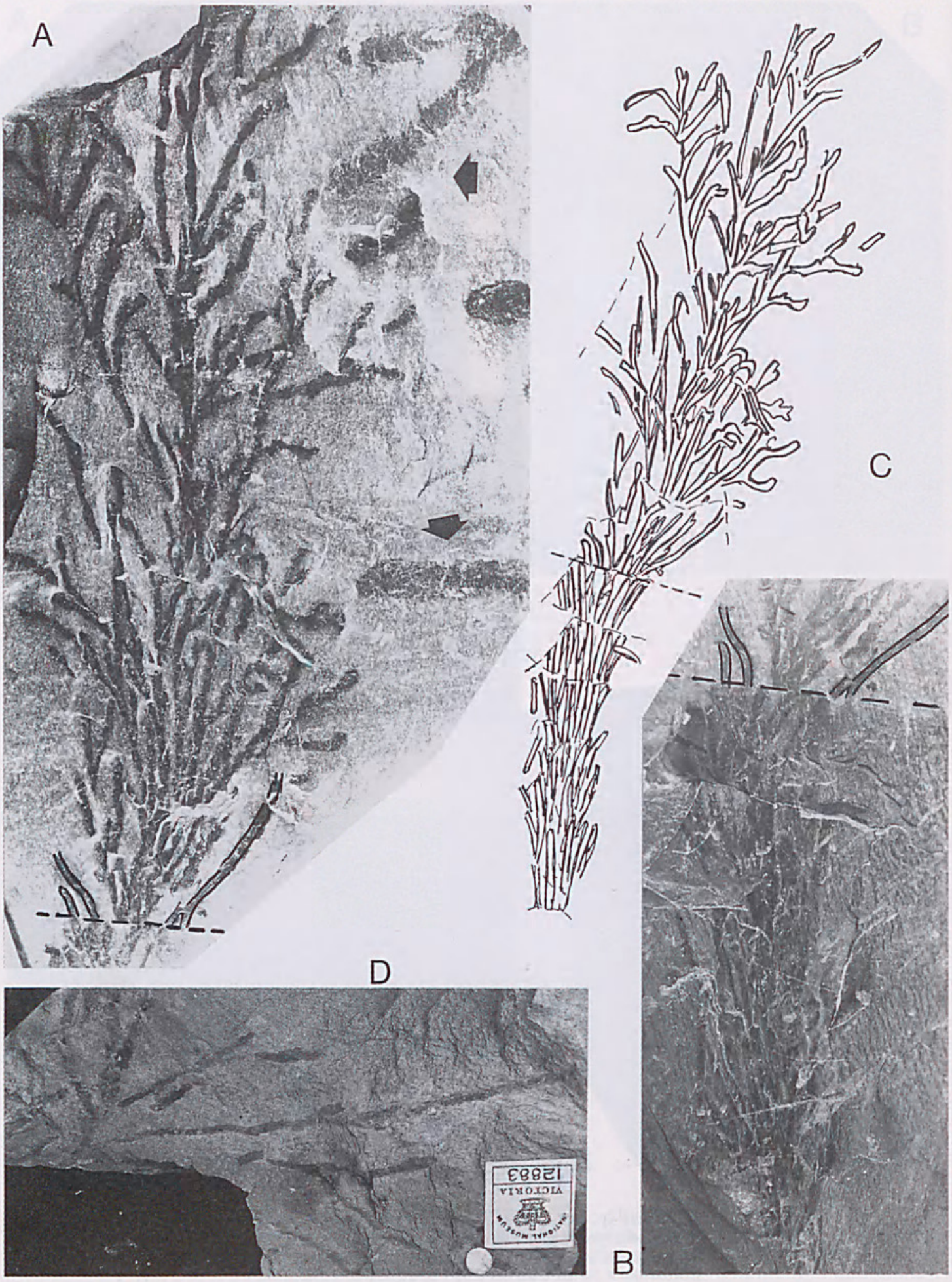
A
C
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exhibit one or two strongly curving branches that may divide or give off single side branches which themselves divide. Near base of two largest lobes (Fig. 3D-F) are some trichotomous divisions but they are less common (2 in one individual; 1 in other). Distance between successive dichotomies ranging between 8 and 15 mm; width of stem away from dichotomies varying from 3 to 6 mm; tips of branches expanded laterally and lobate.

REMARKS: This species displays considerable variation in form of the lobes and in type of branching but there appears to be an obscure central stem in some specimens. Almost all species of *Buthotrephis* including the type, possess longer and, in most cases, narrower lobes and have greater distance between successive branching points. *Buthotrephis divaricata* White 1902 not Kidston 1886 from the Late Silurian of Indiana is the most similar species being comparable in overall size, in lobe width and, for the most part, in style of branching (e.g., the distal forking of almost every lobe). However, it may be distinguished by the thallus form of numerous lobes branching only once, rarely twice, above the base and the absence of any suggestion of a central stem. We concede that future discoveries emphasizing a considerable range of variation may lead to synonymy of the two species. In that case it should be noted that *B. divaricata* was preoccupied (Kidston 1886) and *B. trichotoma* should include White's specimen (1902, p. 16).

Distinction of *Hungerfordia* Fry & Banks 1955 from some species of *Buthotrephis* may depend on knowledge of the basal parts and differentiation between *B. trichotoma* and *H. dichotoma* Fry & Banks 1955 is an example. *Buthotrephis trichotoma* and *B. divaricata* White with wide, relatively short lobes, each with few dichotomies, may prove to be generically distinct from *Buthotrephis* and may possibly be better accommodated within *Hungerfordia*; this may be assessed when the bases of these two species become available.

Yeaia flexuosa Douglas 1983 from the Upper Silurian of the Melbourne Trough is a dichotomously-branching alga but the long intervals of up to 100 mm between dichotomies giving the branches a long strap-like form distinguish it from *B. trichotoma*.

Buthotrephis walhalla sp. nov.
Fig. 4

1912 *Bythotrephis* [sic] *divaricata* Kidston; Chapman, p. 231, pl. 38, fig. 1.
1981 Large thallus. Douglas, p. 10, pl. 3, fig. 10.

ETYMOLOGY: A noun in apposition.

MATERIAL, LOCALITY AND AGE: Holotype NMVP52501. Paratypes NMVP48927, 175698, 175699. All are from 200 m below the surface in New Long Tunnel Adit, Walhalla at GR433213 on Walhalla (851D) 1:31680 topographical map; they occur as thin black impressions on a sheared and disrupted grey-black siltstone bed of the Norton Gully Sandstone, Walhalla Group. The age of this horizon, based on stratigraphic relationship to graptolite faunas, is tentatively put at Late Pragian (i.e. Early Devonian).

DESCRIPTION: Thallus compressed, upper part branching sub-dichotomously, branches long, narrow and flexuous, width 1-2 mm, margins undulate, sometimes contorted to form small protrusions. Thallus length 200 mm or more, elongated, fan-shaped; basal stipe with straighter unbranched segments of 10-20 mm length, arising at acute angle and forming thick dense mass.

REMARKS: The holotype provides new information on the base of the thallus which may or may not be pertinent to other members of the genus, which, with very few exceptions, is known only from distal fragments of the thallus. The close pressed linear segments around the base give this part of the new species a very different appearance to the rest of the fan-shaped thallus. It is superficially similar to the stem of the lycophyte *Baragwanathia longifolia* Lang & Cookson 1935. On the same specimen (Fig. 4A) are remnants of a larger fossil (arrowed) that appears to branch similarly to *B. walhalla* and could well belong to one of the larger species of *Buthotrephis* with wider lobes such as *B. flexuosa* Hall 1847.

Among species of *Buthotrephis* none could be confused with *B. walhalla* in features of the basal part; but in more distal parts of the thallus forms such as *B. subnodosa* Hall 1847 and *B. rebskei* Schweitzer 1982 are quite similar to *B. walhalla* in numbers of forks and in thickness of lobes. However, the average distance between forks is less in *B. walhalla* than in those other species. The closest form is probably *B. subnodosa* whose subnodulose form of the lobes is shared by the new Victorian species.

Maceration to find anatomical features for classification provided no cuticular remains and this in itself provides meagre negative evidence for the assignment of these fossils to the Thallophyta.

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Fig. 4—*Buthotrephis walhalla* sp. nov. A, B, upper and lower parts respectively, of holotype thallus (dashed line common to the two prints), NMVP52501, X1 and X1.1 respectively. Arrows on A point to fragments of a much larger specimen of *Buthotrephis* possibly *B. flexuosa* Hall 1847. C, line drawing of holotype, NMVP52501, X 0.7. D, fragmentary specimen described by Chapman (1912) as *B. divaricata* Kidston from Vale's Adit, Walhalla, NMVP12883, X 1.1.

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MYODELTHYRIUM, A NEW PERMIAN GENUS OF THE SYRINGOTHYRIDACEA FREDERIKS 1926 (BRACHIOPODA)

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ABSTRACT: *Myodelthyrium* is proposed as a new generic name for a syringothyridacean species originally placed in *Pseudosyringothyris* Frederiks 1916. The type species is *M. dickinsi* (Thomas 1971). Its distinguishing structures include a pair of muscle scars on the inside of the delthyrial plate.

The distinctive West Australian Permian species *Pseudosyringothyris dickinsi* was described by Thomas (1971). The species was earlier reported in an unpublished Ph.D. thesis of the University of Melbourne by Thomas in 1961. This species is a prominent constituent of the Early Permian (Sterlitamakian) faunas of the Callytharra Formation of the Carnarvon Basin. It is also known from the Canning Basin and is a useful index fossil for interbasinal correlation.

The species is clearly a member of the spiriferid superfamily Syringothyridacea Frederiks 1926, as interpreted by Ivanova (1972), characterised by punctate (mostly) spiriferids with high ventral interareas, simple lateral costae, generally smooth ventral sinuses and smooth or medially-grooved fastigia. *Syringothyris* Winchell 1863 and *Pseudosyrinx* Weller 1914 are representative of the 20 or so genera now included in the superfamily. Many are large forms.

Thomas (1971) ascribed *P. dickinsi* to *Pseudosyringothyris* Frederiks 1916, provisionally accepting the interpretation of Gobbett (1964, p. 174) that his punctate species *P. borealis* Gobbett as well as an unnamed species from the Permian (Svalbardian) Spirifer Limestone of Spitzbergen belonged in *Pseudosyringothyris*. The Spitzbergen species possess a median longitudinal ridge on the inside of the delthyrial plate, with depressions on each side.

Frederiks (1916) erected *Pseudosyringothyris* as a subgenus of *Cyrtia*, type species *Cyrtia* (*Pseudosyringothyris*) *karpinskii* Frederiks 1916. His English summary reads: "Shell large, transverse; hinge line straight, usually as long as the greatest breadth of the shell; area high flat; sinus deep and wide; surface ornamented by many radial ribs. Internally between the dental plates in the delthyrium is a transverse delthyrial plate, which has on the interior side a roller-like callosity, called a pseudosyrings" (sic). The pseudosyrinx was considered by Frederiks (1916, p. 49) to represent a stage in the evolution of the syrinx. The roller-like callosity was illustrated in a section (Frederiks 1916, fig. 16 and plate 3, fig. 9a), reproduced in Thomas (1971, fig. 47). This structure is a shell thickening of the inner delthyrial plate with a median depression. Thomas (1971, p. 127, p. 138) regarded it as an adventitious secondary thickening similar to that shown in some specimens of *P. dickinsi* (Thomas 1971, fig. 55g). However, one of Frederiks' illustrations (Frederiks 1916, pl. 3, fig. 1d) seems to show a longitudinal median ridge on the inner delthyrial plate.

Pseudosyringothyris karpinskii was based on a small collection (1-2 specimens apparently) distinguished from the more numerous examples of *Cyrtia kulikiana* Frederiks 1916. All were collected from the Bolshezemelskaya Tundra of the northern Urals, U.S.S.R. The types of *P. karpinskii* and some of the specimens of *C. kulikiana* came from the Adzva River area. Frederiks noted the close resemblance of the two species but distinguised *P. karpinskii* on its pseudosyrinx, the outline of the umbo and the finer, sometimes dichotomous, ribs.

Pseudosyringothyris has been recognised in the Permian of the USSR by some Russian authors. Ivanova (1960) listed it with a brief diagnosis but without illustration as comprising only the type species, from the Bolshezemelskaya Tundra and from Novaya Zemlya. Solomina (1970) described a new species *P. inopinatus* from Northern Verkhoyan without illustrating or describing the internal delthyrial features. Zavodovskii (1970) described three species from north-eastern USSR: *P. inopinatus* and two new species *P.*(?) *russiensis* and *P. parenensis*. The inner delthyrial structures were not described or illustrated. Kalashnikov *in* Kalashnikov and Ustritskii (1981) provisionally included a new species *P.*(?) *ustritskyi* which appears to lack a delthyrial plate.

Grigoryeva (1977), in a comprehensive review of the licharewiids of Siberia and the Arctic, was critical of the use of *Pseudosyringothyris* by Gobbett (1964) and by Thomas (1971). She stated that the validity of *Pseudosyringothyris* is uncertain because *P. karpinskii* is said to be indistinguishable from *C. kulikiana* (Frederiks), the type species of *Cyrtella* Frederiks 1924. Extensive collecting by Ifanova (1972) from the topotype areas of both species has failed to provide any more examples of Frederiks' "pseudosyrinx" structures. *Cyrtella kulikiana* Frederiks is reported by Grigoryeva (1977) and by Grigoryeva and Kotlyar (1966) to possess a false or pseudodelthyrial plate, formed by internal secondary thickening in the delthyrial region.

From my enquiries in Leningrad in 1968, Frederiks' type specimens appear to be no longer available. In consequence, because of the uncertainties of the validity