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Randall F. Miller

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Article abstract

Fragments of the large eurypterid *Pterygotus*, recently collected from the Devonian Campbellton Formation at Atholville, New Brunswick, are identified as belonging to *P. anglicus* Agassiz. The only previous *Pterygotus* specimens from this site, collected in 1881, were assigned to a new species *P. atlanticus* Clarke and Ruedemann, in 1912. Clarke and Ruedemann's suggestion that *P. atlanticus* might turn out to be a small specimen of *P. anglicus* is supported by this new find. However, possible revision of *P. atlanticus* awaits the discovery of additional, more complete, material.

Note on *Pterygotus anglicus* Agassiz (Eurypterida: Devonian) from the Campbellton Formation, New Brunswick

Randall F. Miller

Steinhammer Palaeontology Laboratory, New Brunswick Museum,
277 Douglas Avenue, Saint John, New Brunswick E2K 1E5, Canada

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Fragments of the large eurypterid *Pterygotus*, recently collected from the Devonian Campbellton Formation at Atholville, New Brunswick, are identified as belonging to *P. anglicus* Agassiz. The only previous *Pterygotus* specimens from this site, collected in 1881, were assigned to a new species *P. atlanticus* Clarke and Ruedemann, in 1912. Clarke and Ruedemann's suggestion that *P. atlanticus* might turn out to be a small specimen of *P. anglicus* is supported by this new find. However, possible revision of *P. atlanticus* awaits the discovery of additional, more complete, material.

On a déterminé que les fragments du grand euryptéride *Pterygotus* récemment recueillis dans la Formation dévonienne de Campbellton à Atholville, Nouveau-Brunswick, appartenaient au *P. anglicus* Agassiz. Les seuls spécimens antérieurs de *Pterygotus* de cet emplacement, prélevés en 1881, avaient été attribués à une nouvelle espèce, le *P. atlanticus*, par Clarke et Ruedemann, en 1912. Cette nouvelle découverte appuie l'hypothèse de Clarke et Ruedemann à l'effet que le *P. atlanticus* pourrait en réalité constituer un petit spécimen de *P. anglicus*. La révision possible de la nature du *P. atlanticus* nécessitera néanmoins la découverte de matériel supplémentaire plus complet.

[Traduit par la rédaction]

INTRODUCTION

Among reports of rare occurrences of eurypterids in New Brunswick, two descriptions of *Pterygotus* exist. *Pterygotus* sp., collected in 1881 from the Devonian Campbellton Formation at Atholville (Whiteaves, 1883), was later described as *P. atlanticus* Clarke and Ruedemann (1912). A second specimen, *Pterygotus* sp., collected before 1909 from the Devonian at Dalhousie, was figured by Clarke (1909). The two occurrences are easily confused since the Campbellton specimen, *P. atlanticus*, is referred to as *Pterygotus* sp. prior to 1912 and described as being from the Dalhousie Formation, New Brunswick. The reference to Ells (1883) used by some authors for *Pterygotus* sp. from Dalhousie (Copeland and Bolton, 1960; Kjellesvig-Waering, 1964) should be applied to *Pterygotus atlanticus*, since it is clear that in his report on field work for 1881, Ells (1883) was referring to the same Campbellton specimens described by Whiteaves (1883).

The Devonian Campbellton Formation exposed at Atholville, New Brunswick has been well known as a source of ostracoderm, arthrodire and acanthodian fish (Whiteaves, 1883; Woodward, 1892; Traquair, 1893) since the first fossils were discovered in 1881 (Whiteaves, 1889). In addition to the eurypterid and fish, the fauna includes molluscs and plants. This paper reports on new specimens of *Pterygotus* from the Atholville site that provide additional evidence to supplement four fragments already known. Two new partial specimens of chelae, the greatly enlarged pincerlike chelicerae that help distinguish *Pterygotus* from other eurypterids, are much larger than those previously described from Atholville and are assigned to *P. anglicus* Agassiz (1844).

LOCATION AND STRATIGRAPHY

The specimens described here were recovered from calcareous shale or mudstone of the Devonian (Emsian) Campbellton Formation (Williams *et al.*, 1985) exposed on the bank of the Restigouche River at Atholville (47°59'45"N; 66°42'50"W, Fig. 1). The Atholville beds (Dineley and Williams, 1968) are exposed for over 2 km from west of the New Brunswick-Quebec bridge to midway between Pratt Point and Ferguson Point (Fig. 1). They are composed of a steeply inclined basal coarse breccia overlain by a succession of interbedded sandstones and shales. A total thickness of about 15 m is exposed. The Campbellton Formation unconformably overlies volcanics of the Lower Devonian Dalhousie Group. The unconformable upper contact with the overlying Carboniferous Bonaventure Formation (Williams *et al.*, 1985) is beneath the Restigouche River (Dineley and Williams, 1968). The Atholville beds are covered by slump and vegetation in places and have not been described in detail. Plans to examine the stratigraphy and paleoenvironment of the Atholville section are currently underway. Only general comments are provided here in anticipation of a larger scale project.

The new specimens described here were collected near the west end of the Atholville exposure. At the fossil locality about 12 m of section is exposed (Fig. 2). Approximately 7 m of light brown mudstone alternating with plant-rich buff-coloured sandstone is overlain by about 4 m of dark grey mudstone and almost 2 m of brown to black mudstone. One specimen of *Pterygotus* was collected *in situ* in the upper 30 cm of the dark grey mudstone, about 10.5 m west of

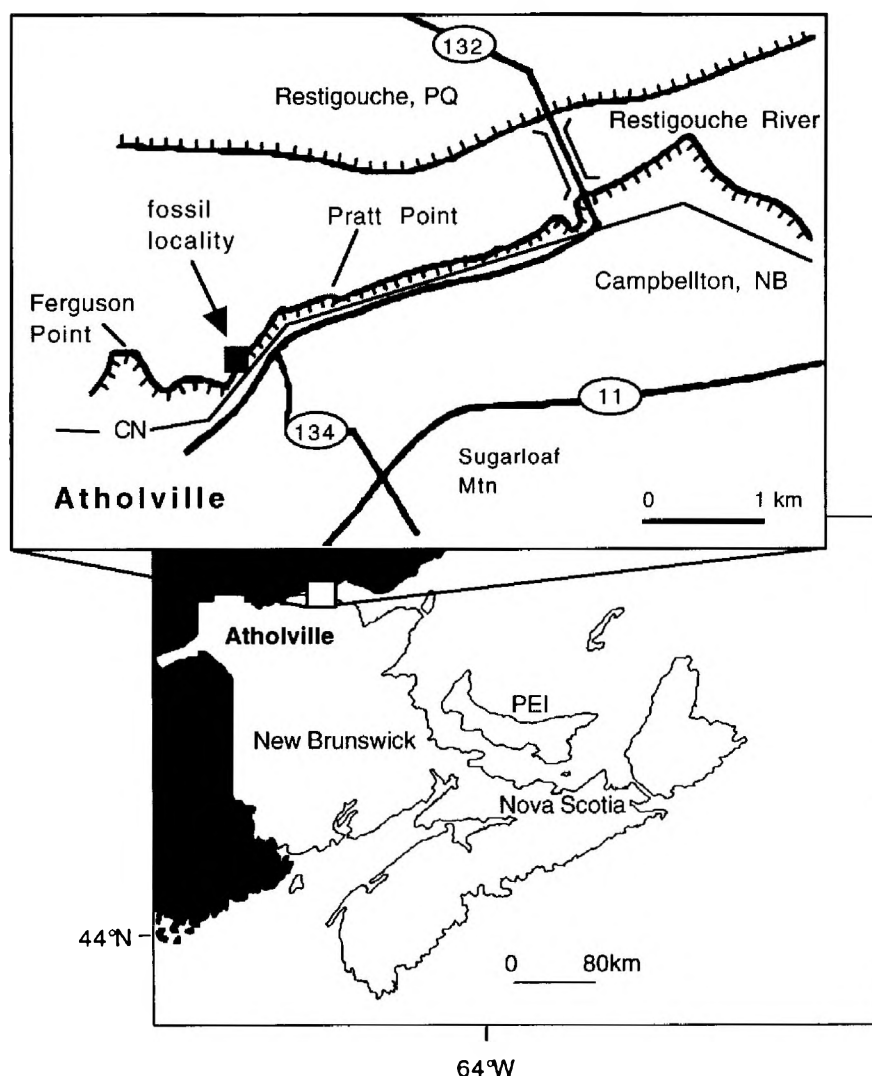


Fig. 1. Location of the Atholville beds, northern New Brunswick showing the *Pterygotus anglicus* Agassiz fossil locality.

a drainpipe. The other two specimens were recovered from the same rock type from a single slab of float on the beach about 9 m west of the drainpipe.

SYSTEMATIC PALAEOLOGY

Various classification schemes for pterygotids have been used and currently five genera are recognized: *Acutiramus*, *Erettopterus*, *Pterygotus*, *Truncatiramus* and *Jaekelopterus*. The classification used by Kjellesvig-Waering (1964) and reviewed by Plotnick and Baumiller (1988) is used here.

Class Merostomata Dana, 1852
Subclass Eurypterida Burmeister, 1843
Family Pterygotidae Clarke and Ruedemann, 1912
Genus *Pterygotus* Agassiz, 1844
***Pterygotus anglicus* Agassiz, 1844**
 (Fig. 3a-c)

Material: Three specimens on two slabs. A free ramus of the chelicera, NBMG 9774/1 and an incomplete unidenti-

fied fragment, possibly a paddle (?) NBMG 9774/2. A free ramus of the chelicera, NBMG 9775. All specimens are deposited in the New Brunswick Museum (NBMG).

Description: The larger of the two free rami of the chelicerae, NBMG 9774/1 (Fig. 3a), is 135 mm long. Width of free ramus at centre of central tooth, 18 mm. The order and size of dentition and tapering aspect of the chelicerae matches that of *P. anglicus* as described by Kjellesvig-Waering (1964) from the Lower Devonian of Scotland. Much of the cuticle has been removed and the specimen is partly buried by matrix. The smaller free rami of the chelicerae, NBMG 9775 (Fig. 3b), is 95 to 100 mm long. Width of free ramus at centre of central tooth, 10 mm. The third unidentified fragment, NBMG 9774/2 (Fig. 3c) may be a partial paddle, the distal segment of the swimming leg. It measures 33 mm at the widest point.

Horizon and Locality: Preserved in dark grey mudstone. Devonian (Emsian), Atholville, on bank of Restigouche River, New Brunswick; collected by R.F. Miller, September 30, 1994. NBMG 9774/1,2 found as loose block on beach about 1 m

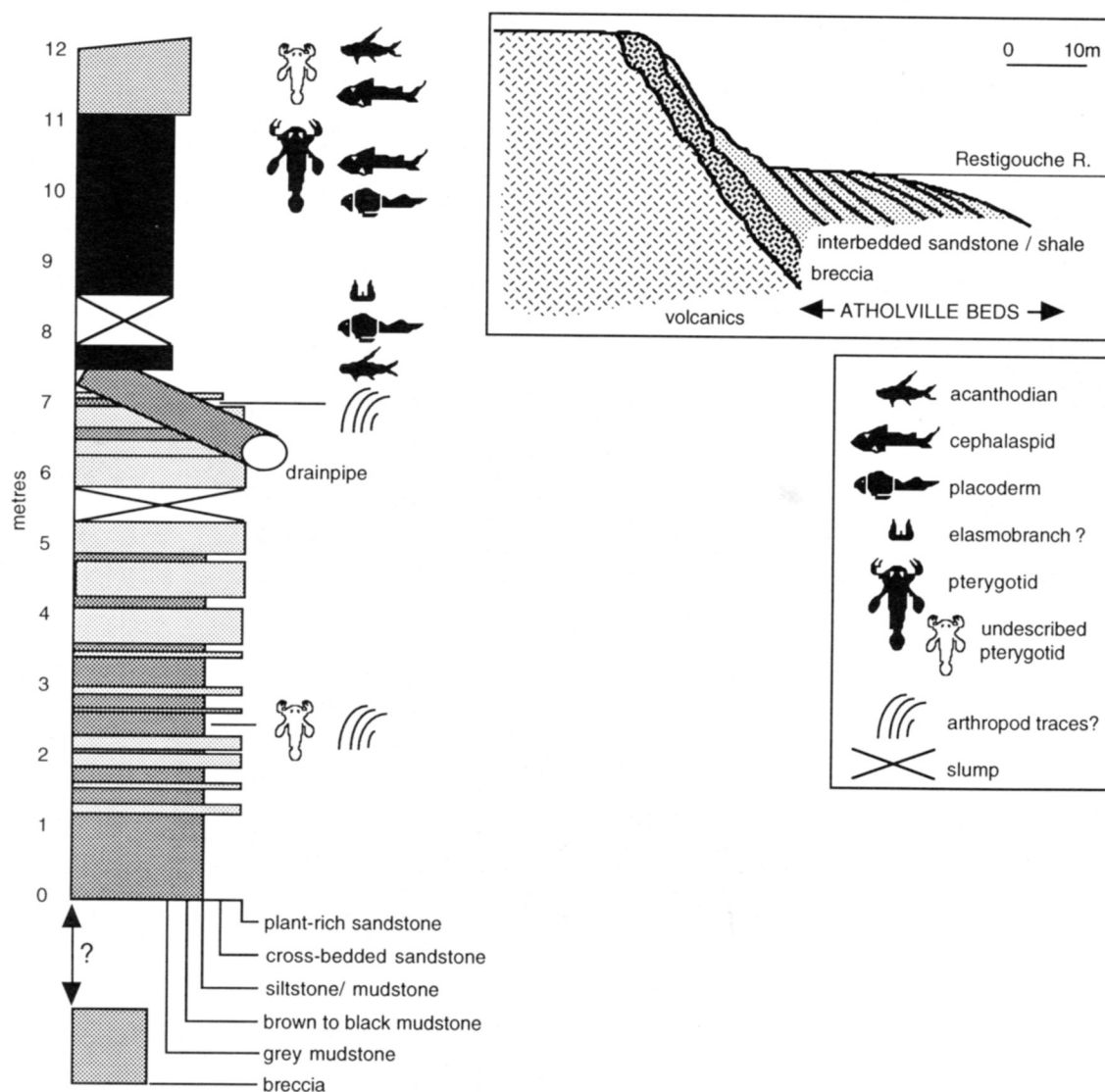


Fig. 2. Generalized stratigraphic section at *Pterygotus anglicus* Agassiz fossil locality in the Campbellton Formation, at the western exposure of the Atholville beds (after Dineley and Williams, 1968), Atholville, New Brunswick. Occurrences of pterygotid (including undescribed specimens), fish and arthropod trace fossils noted.

from outcrop and about 1.5 m from *in situ* specimen NBMG 9775.

Remarks: Specimen NBMG 9774/1 is a large free ramus of the chelicera and suggests a specimen of considerable size. The specimen is similar to *P. anglicus* Agassiz from Balruddery, Forfarshire, Scotland (Kjellesvig-Waering, 1964, pl. 54, fig. 5) which was estimated to have reached a length of 1.7 m from the anterior of the prosoma to the posterior end of the telson. NBMG 9775 appears to represent a smaller specimen of the same species, about 1 to 1.2 m long.

DISCUSSION

Eurypterid remains are rare in New Brunswick, having been described from only three localities: the Devonian Campbellton Formation at Atholville (*Pterygotus anglicus*, *P. atlanticus*), the Devonian at Dalhousie (*Pterygotus* sp.), and the Pennsylvanian Lancaster Formation at Fern Ledges,

Saint John (*Eurypterella ornata*, *Eurypterus pulicaris*, and *Eurypterus* sp.) (Copeland and Bolton, 1960). The Pennsylvanian specimens are poorly preserved and their affinity is uncertain. A fourth specimen from Fern Ledges, *Belinuropsis wigudensis* (Matthew, 1910), has also been considered a possible, but doubtful eurypterid (Miller, 1995).

Specimens of *Pterygotus* first noted by Whiteaves (1883) from Atholville were described by Clarke and Ruedemann (1912) and assigned to a new species *P. atlanticus*, a species designation which continued to be used (Russell, 1947, 1954; Kjellesvig-Waering, 1964) although not without some doubt as to its validity (Pageau, 1969). Their brief description was based on three fragments, a chelicera (Fig. 4a), the coxa of a swimming leg (Fig. 4b), and a fragment of metastoma (Fig. 4c) (catalogued as syntypes, GSC 3239, 3239a-c; Bolton, 1966). The free ramus of *P. atlanticus* (GSC 3239) measures at least 50 mm long and has a width at centre of central tooth of 7 mm, suggesting an animal about 65 cm in length from anterior of the prosoma to the posterior end of

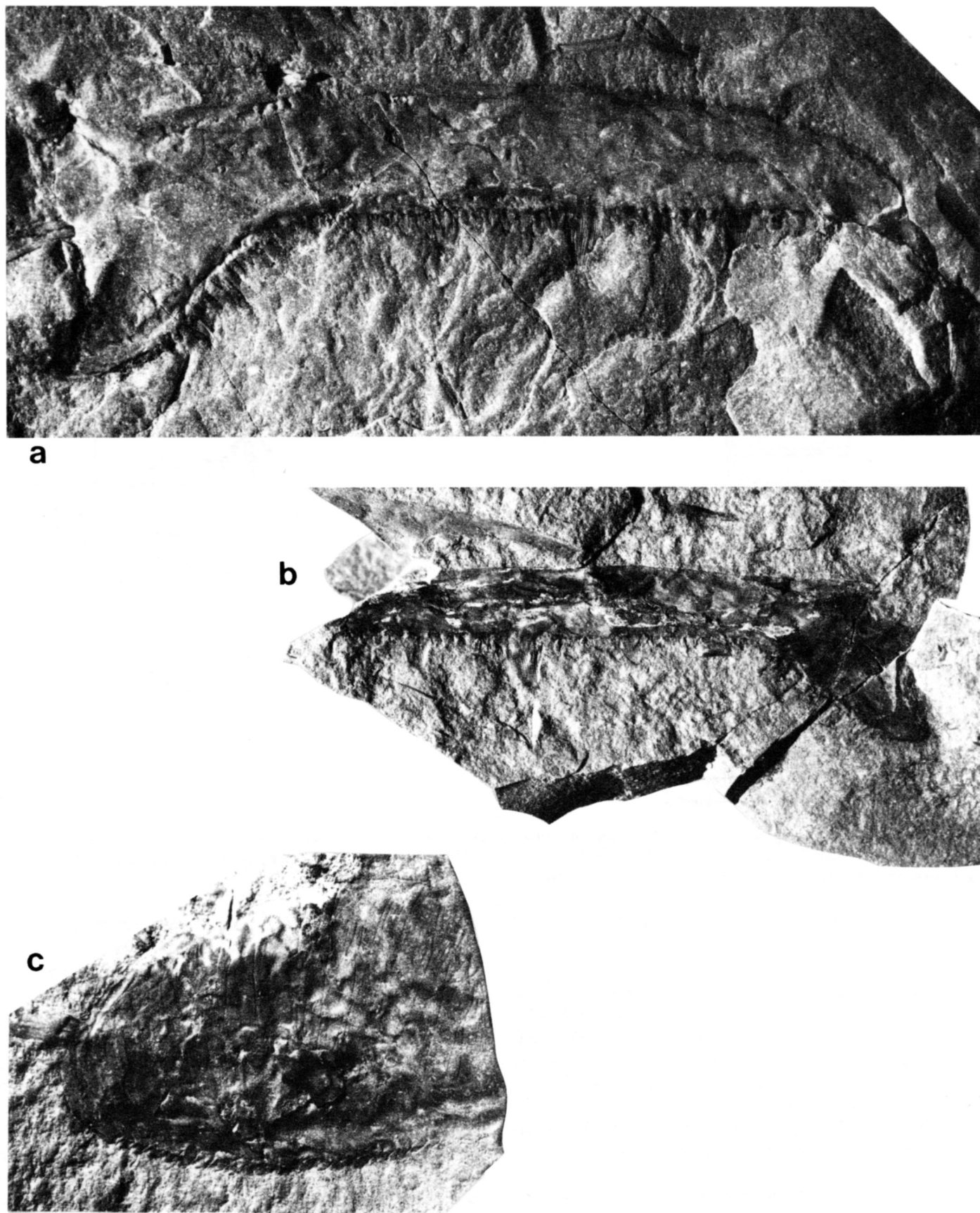


Fig. 3. *Pterygotus anglicus* Agassiz, Devonian, Campbellton Formation, Atholville, New Brunswick. (a) free ramus, NBMG 9774/1, x 1.3, (b) free ramus, NBMG 9775, x 1.3, (c) unidentified fragment, possibly a paddle NBMG 9774/2, x 1.7.

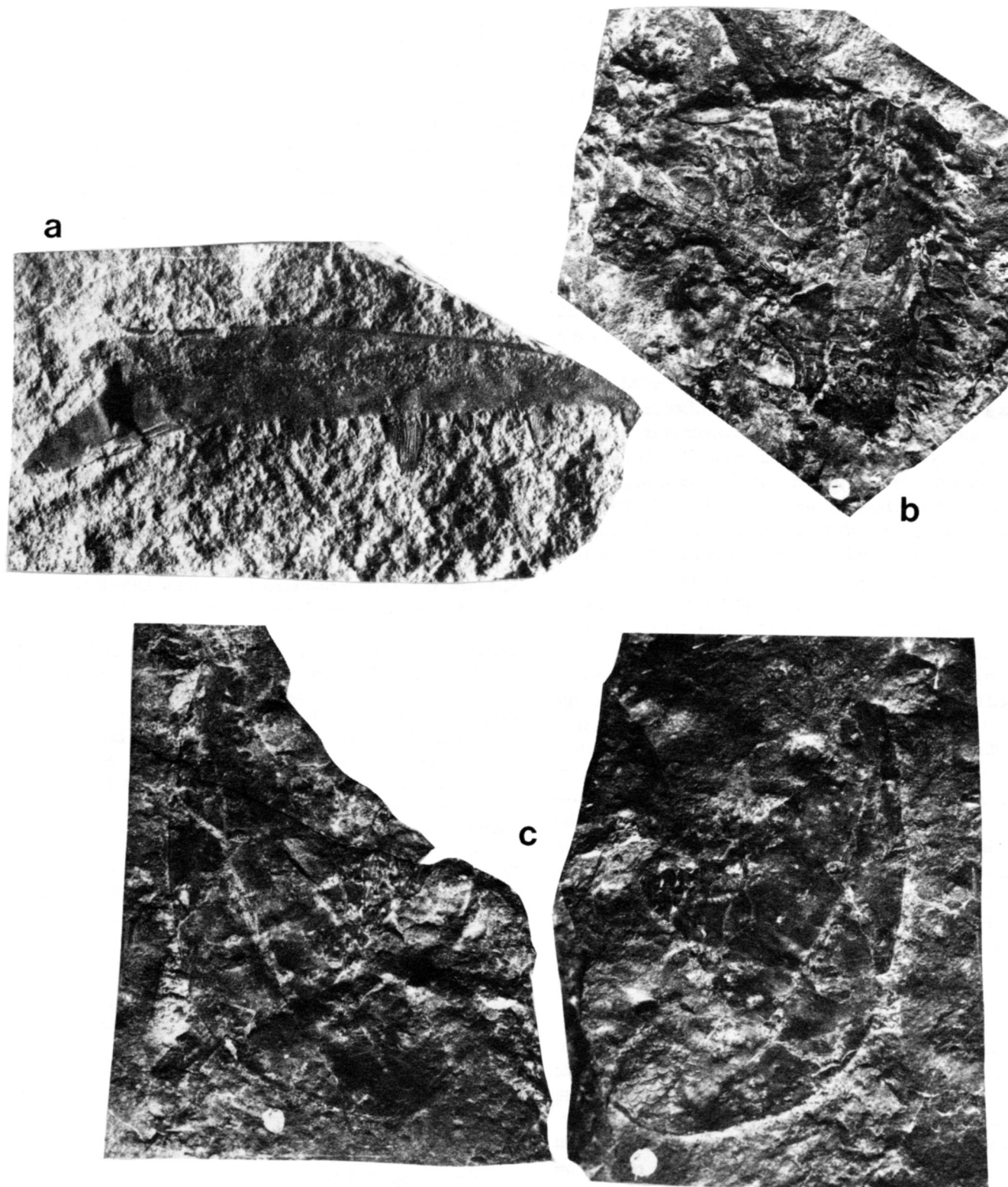


Fig. 4. *Pterygotus atlanticus* Clarke and Ruedemann, Devonian, Campbellton Formation, Atholville, New Brunswick. (a) free ramus GSC 3239, x 2.2 (whitened with ammonium chloride), (b) coxa of swimming leg, GSC 3239b, x 1.5, (c) metastoma part and counterpart, GSC 3239a (right), GSC 3239c (left), x 1.8.

the telson. Clarke and Ruedemann (1912, p. 358) considered *P. atlanticus* to be "of considerable dimensions" and compared it with *Pterygotus anglicus* Agassiz. They suggested that with larger collections the species might prove to be "a vicarious form" of *P. anglicus*. Considering the new

specimens described here as *P. anglicus*, Clarke and Ruedemann's suspicions were likely correct. The dimensions and dentition of the *P. atlanticus* chelicera (Fig. 4a) appear very similar to *P. anglicus*. Revision of *P. atlanticus* is probably necessary but redescribing *P. atlanticus* without additional

material would more likely add confusion. It is unknown which unit specimens of *P. atlanticus* were collected from, but the lithology is the same as that of NBMG 9774 and NBMG 9775. This dark grey shale is found in only the upper part of the section (Fig. 2).

The three chelicera fragments of *Pterygotus* recovered so far from Atholville probably all belong to one species and indicate three individual animals with total length (prosoma to telson) ranging from 65 cm to 1.7 m. Clarke and Ruedemann (1912) believed the majority of eurypterid remains found are the cast exuviae from the frequent moulting of individuals, and Kjellesvig-Waering (1964, p. 332) considered *Pterygotus* to be "definitely gregarious, at least during ecdysis" which may account for a wide range of sizes of individuals from one small locality.

In addition to pterygotid remains the slab NBMG 9774 contains a headshield fragment of an unidentified cephalaspid. Spines of an acanthodian, possibly *Gyracanthus incurvus*, occurred nearby NBMG 9775 and also on GSC 3239b (Fig. 4b). Associations of *Pterygotus* and fish have been noted previously (Kjellesvig-Waering, 1961, 1964), the common belief being that *Pterygotus* was one of the chief predators in middle Paleozoic world. Evidence suggests, however, that the chelicerae were adapted for cutting and grasping, not crushing, a morphology as consistent with scavenging or browsing as with predation (Kjellesvig-Waering, 1964; Plotnick and Baumiller, 1988).

The most complete summary of fish remains from Atholville compiled by Gardiner (1966), with names updated here, includes *Cephalaspis acadica*, *C. jexi*, *Yvonaspis campbelltonensis*, *Phlyctaenius acadicus*, *P. atholi*, *Climatius latispinosus*, *Cheiracanthus costellatus*, *Homacanthus gracilis*, *Gyracanthus incurvus*, *Doliodus problematicus* and *Mesacanthus semistriatus*. The paleoenvironment of the Atholville beds is uncertain. Williams *et al.* (1985) describe it as a fluvial sequence. However, pterygotids, the composition of the fish fauna and the presence of terrestrial plant detritus suggest that at least part of the sequence may represent a lagoon or estuarine environment, if not marine.

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