
ABSTRACT VOLUME

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Conference Logo: The logo for the 2012 Canadian Paleontology Conference is inspired by the fossils of the Burgess Shale. *Anomalocaris canadensis*, the top predator of its time and arguably the most iconic animal of the Cambrian Explosion, is backed by the dramatic Toronto skyline. The lobopod *Hallucigenia sparsa* remains one of the most enigmatic Burgess Shale fossils. The Royal Ontario Museum houses the largest collection of Burgess Shale fossils in the world, with ongoing expeditions since 1975.

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PROLIFIC POTSDAM *PROTICHNITES*: GIANT EUTHYCARCINOID TRACKWAYS FROM BEAUHARNOIS, QUÉBEC

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Cambrian (Series 3 to Furongian) exposures of the Potsdam Group are historically important because they contain some of the first trace fossils described from North America – a suite of parallel footprints called *Protichnites*. *Protichnites* trackways are characterized by repeating arcuate sequences of 8–14 teardrop-shaped imprints bisected by a central 'tail' impression. Although first thought to be produced by tortoises or crustaceans, today they are often attributed to euthycarcinoids, an ancestral arthropod group from which crustaceans, myriapods, and hexapods evolved. Euthycarcinoids occur in Beauharnois outcrops of the Potsdam Group and exhibit characteristics consistent with production of many *Protichnites* and *Diplichnites* trackways.

Beauharnois *Protichnites* are among the most spectacular trackways known from the Cambrian – they are large, up to 23 cm wide and tens of meters long, and exhibit meandering and looping patterns that have merited their display in the foyer of the Redpath Museum and the Geological Survey of Canada. Re-examination of the type locality for *Protichnites* in Beauharnois together with analyses of museum specimens and new field sites, suggests that Beauharnois *Protichnites* were produced in shallow marine to intermittently emergent sand-dominated coastal environments, with tracemakers forming trackways and trails in shallow pools, channels, levees, floodplains, and on windy sand flats. Potsdam Group facies in this region are also characterized by fossilized scyphomedusae strandings, and a variety of corrugated trails, furrows, and resting traces produced by soft-footed molluscs. The most notable of these is *Climactichnites wilsoni*, which in Beauharnois is up to 35 cm wide, implying a tracemaker ~80 cm long. Considered together, the Beauharnois exposures preserve an important record of some of the biggest animals of the Cambrian period, including forms that may have made intermittent forays onto land.

PROLIFIC POTSDAM *PROTICHNITES*: GIANT TRACKWAYS, TRAILS, AND PALEOENVIRONMENTS OF THE CAMBRIAN KEESEVILLE FORMATION (POTSDAM GROUP), BEAUHARNOIS, QUÉBEC

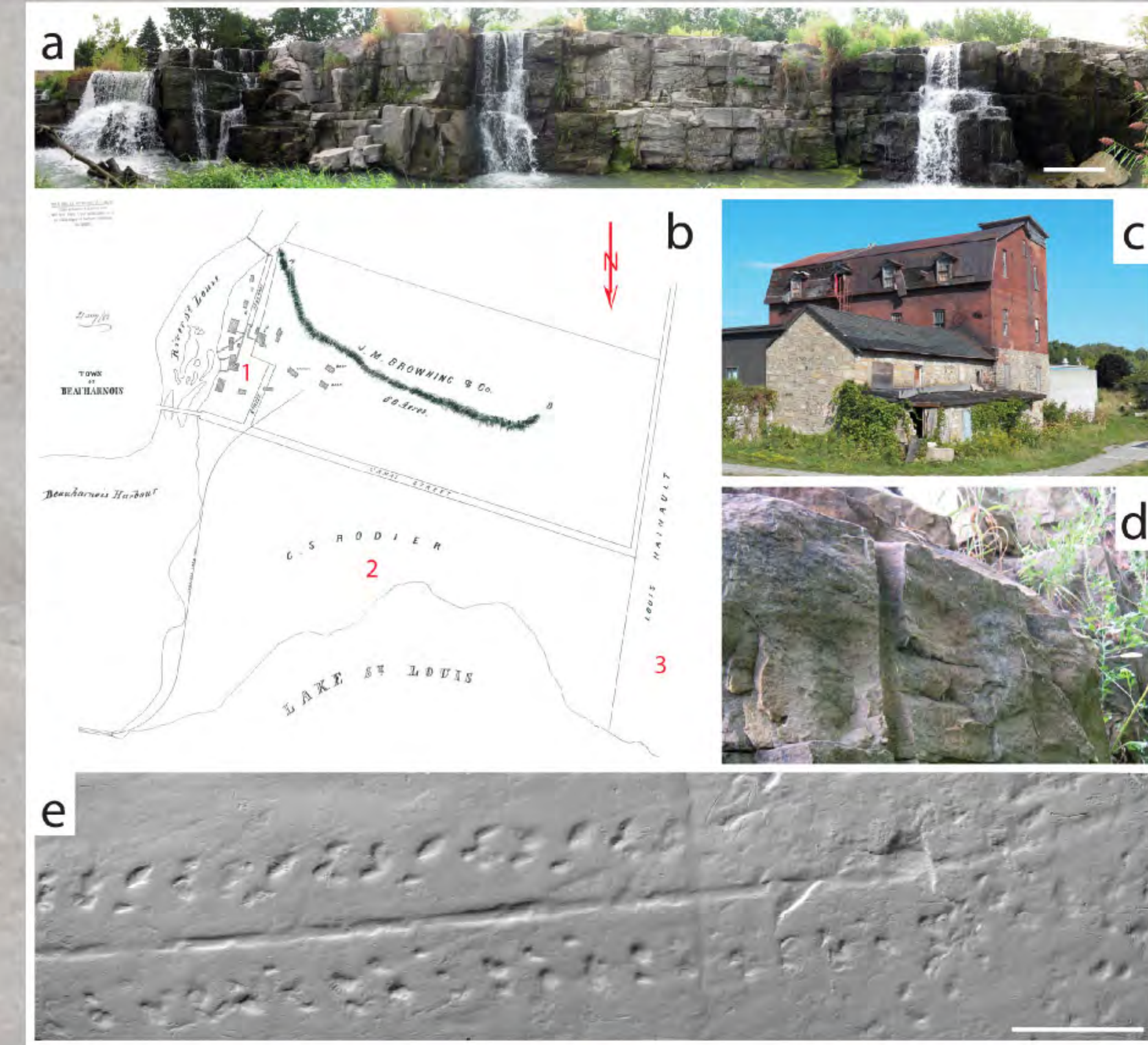
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ABSTRACT

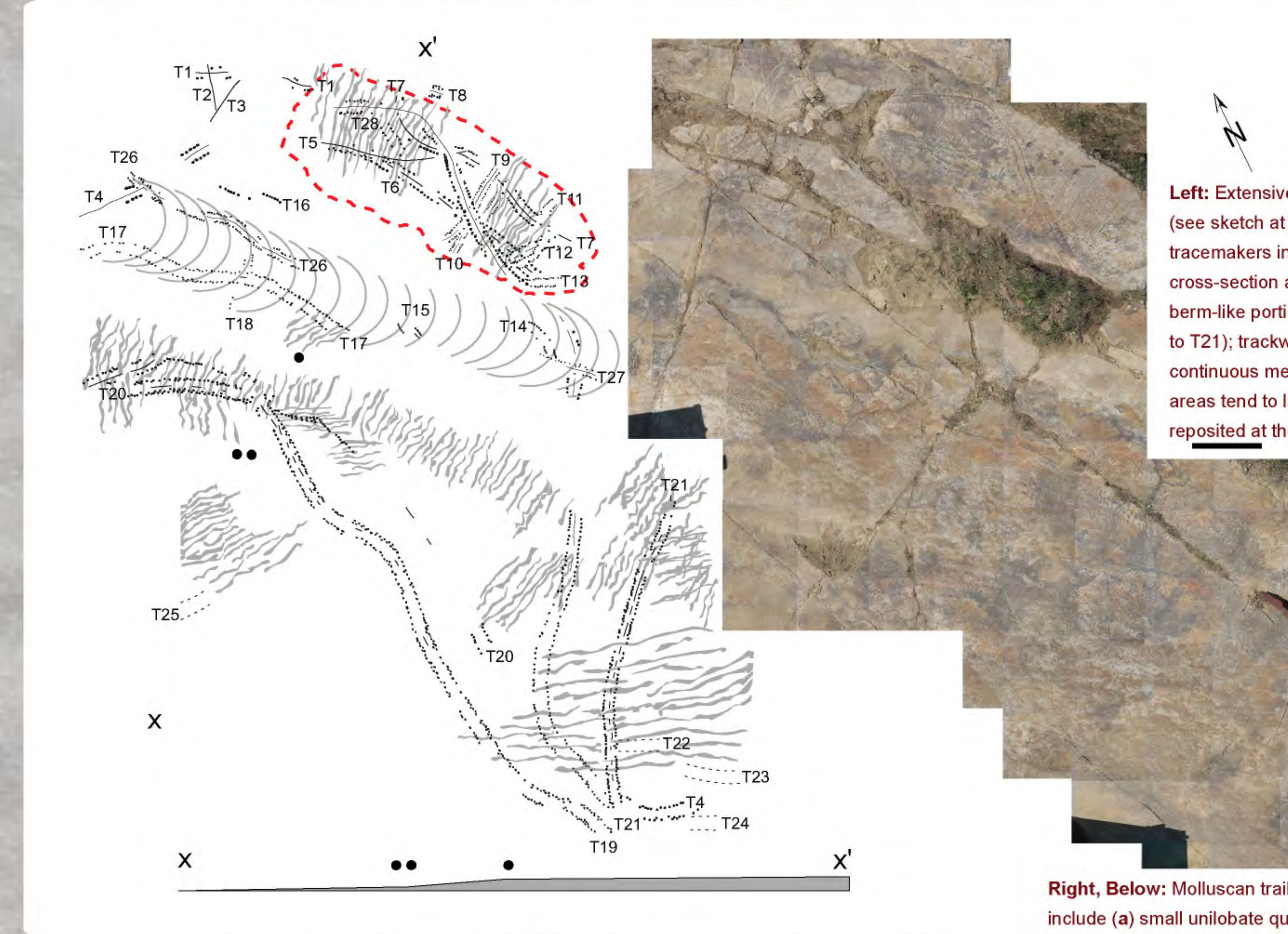
Outcrops of the Keeseville Formation (Series 3-Furongian, Potsdam Group) in Beauharnois, Quebec, are historically important because they contain some of the first and most famous trace fossils described from North America – *Protichnites* and *Climactichnites*. Local bedding planes contain spectacular examples of these fossils – including traces that loop, are up to 32 cm wide, are tens of meters long, and are exposed on emergent paleoshorelines. Associated traces include *Archaeonassa*, *Arenicolites*, *Didymaulichnus*, *Diplichnites*, *Gordia*, *Musculopodus*, *Nenoxites-Scalarituba*, *Phycodes*, and cf. *Teichichnus*. Together with new field sites, rediscovery and study of the type locality for *Protichnites* suggests that these fossils were produced in shallow marine to intermittently emergent sand-dominated coastal environments, with tracemakers occupying shallow pools, channels, levees, floodplains, and windy sand flats. Potsdam Group facies in this region are also characterized by fossilized scyphomedusae, euthycarcinoids, and a variety of corrugated trails, furrows and resting traces produced by soft-footed molluscs. The most notable of these is *Climactichnites wilsoni*, which in Beauharnois is up to 35 cm wide, implying a tracemaker ~80 cm long. Considered together, the Beauharnois exposures house an important record of some of the biggest animals of the Cambrian period, including forms that may have made intermittent forays onto land.

HISTORIC CONTEXT



Historic and geographic context for the type locality of *Protichnites*, including: (a, d) the section at the falls on the St. Louis River; (b) an 1883 map and photograph of the original mills (1, c), near the location (2) where Charles Walcott collected the giant *Climactichnites*-bearing slab that graces the entrance to the Smithsonian Institution's Natural History Museum, and the locality (3) where Richard Owen first described (e) *Protichnites* in 1852 (scale = 10 cm).

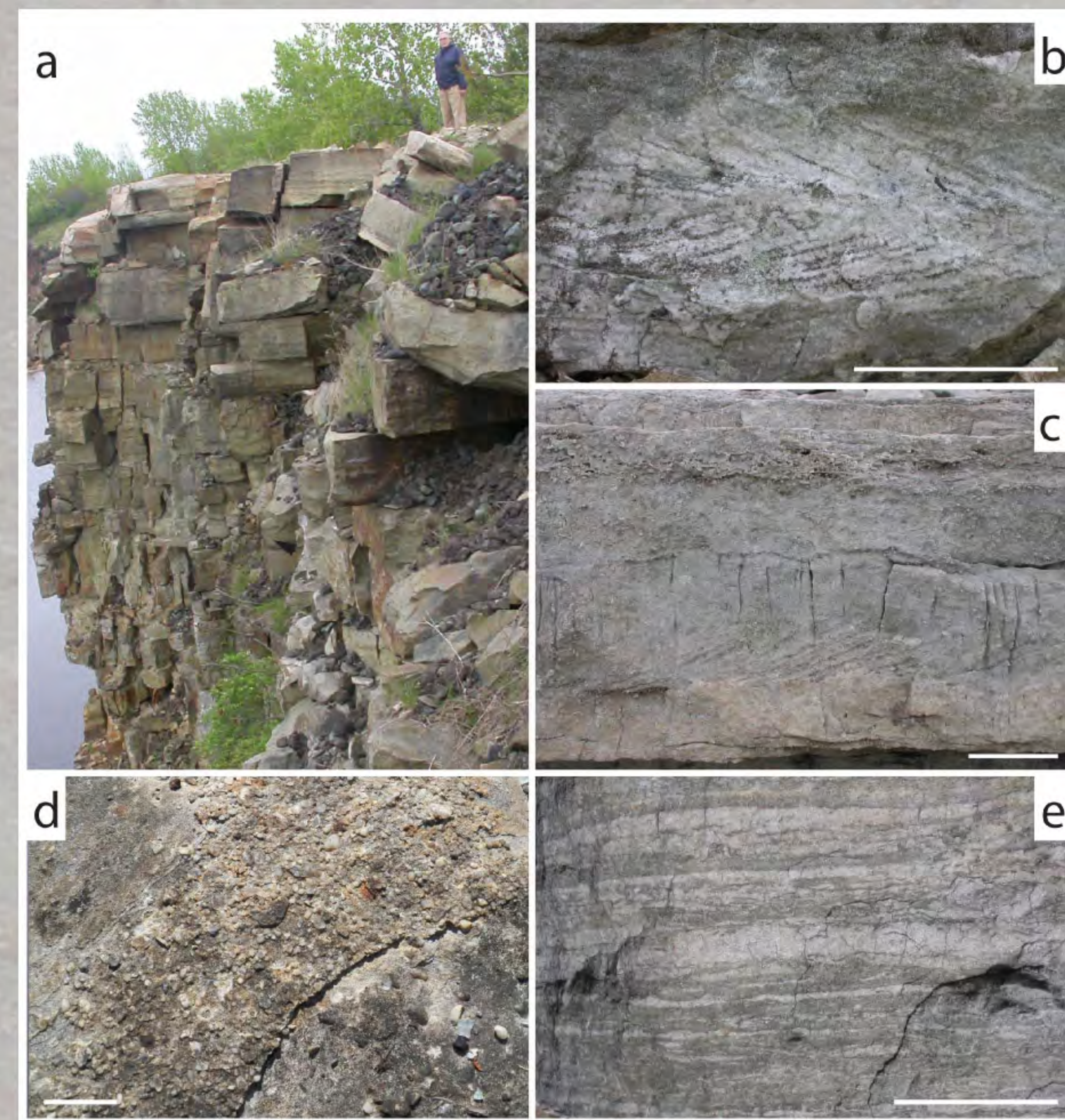
PALEONTOLOGY



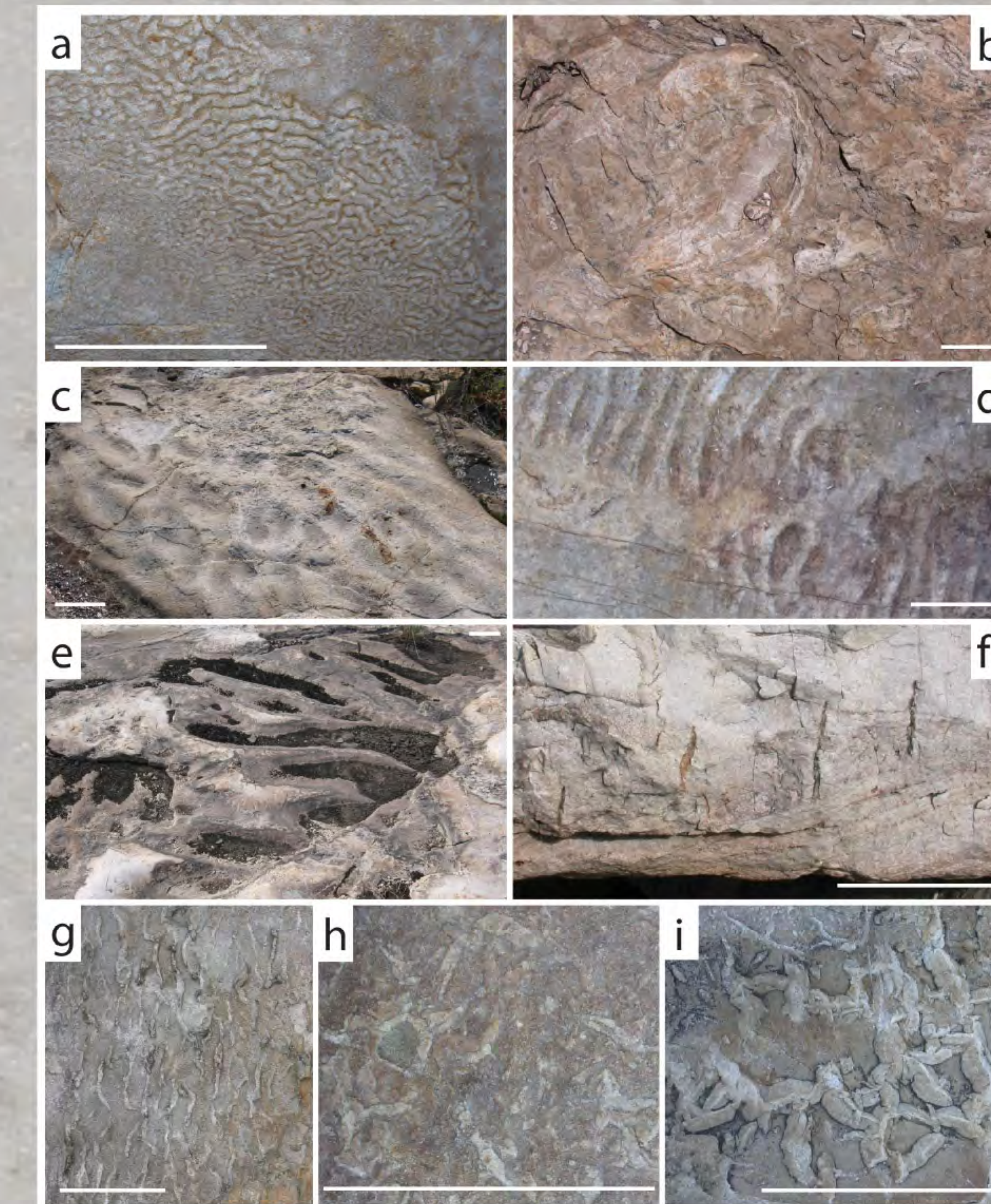
Left: Extensive trackway-bearing surfaces (see photomosaic at right) were mapped (see sketch at left) near the type locality, and record the activities of arthropod tracemakers in and along a shallow paleoshoreline. X-X' is a paleontographic cross-section across the seafloor at this site. The seaward margin of the shallower, berm-like portion of this aquatic regime was oriented NW-SE (approximately from T20 to T21); trackways produced in shallower portions of this surface often have continuous medial furrows and deeply impressed tracks, whereas trackways in deeper areas tend to lack or have intermittent medial furrows. Dashed lines indicate slab repositioned at the Pointe du Buisson Museum. Scale bar = 1 m.

Right, Below: Molluscan trails are abundant, and include (a) small unilobate quasicorrugated furrows such as *Gordia*, (b) bilobate uncorrugated furrows like *Archaeonassa*, as well as (c, d) the giant corrugated trails *Climactichnites wilsoni*. Images (a, d) are bed soles; (b, c) are bed tops. Scale bars = 10 cm.

SEDIMENTOLOGY

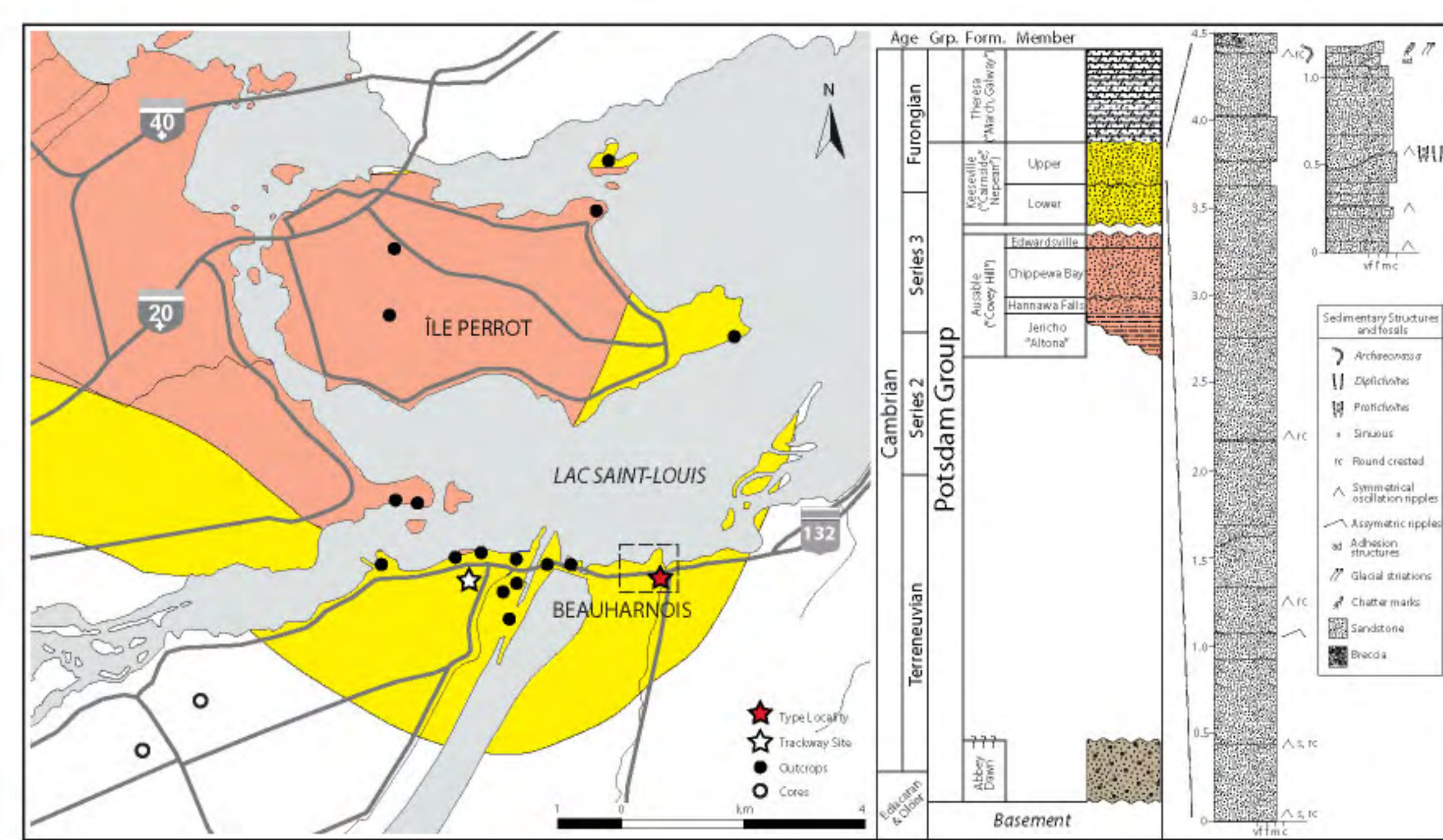


Above: Bedding and bedforms in the Keeseville Fm. are varied, including (a) thick laminated to thinly bedded strata, (b) trough and (c) tabular cross-bedding, (d) granule-ripple veneers, and (e) wavy heterolithic bedding. All images are cross-sectional views. Scale bars: a = 1 m (note geologist at upper right), b-e = 10 cm.

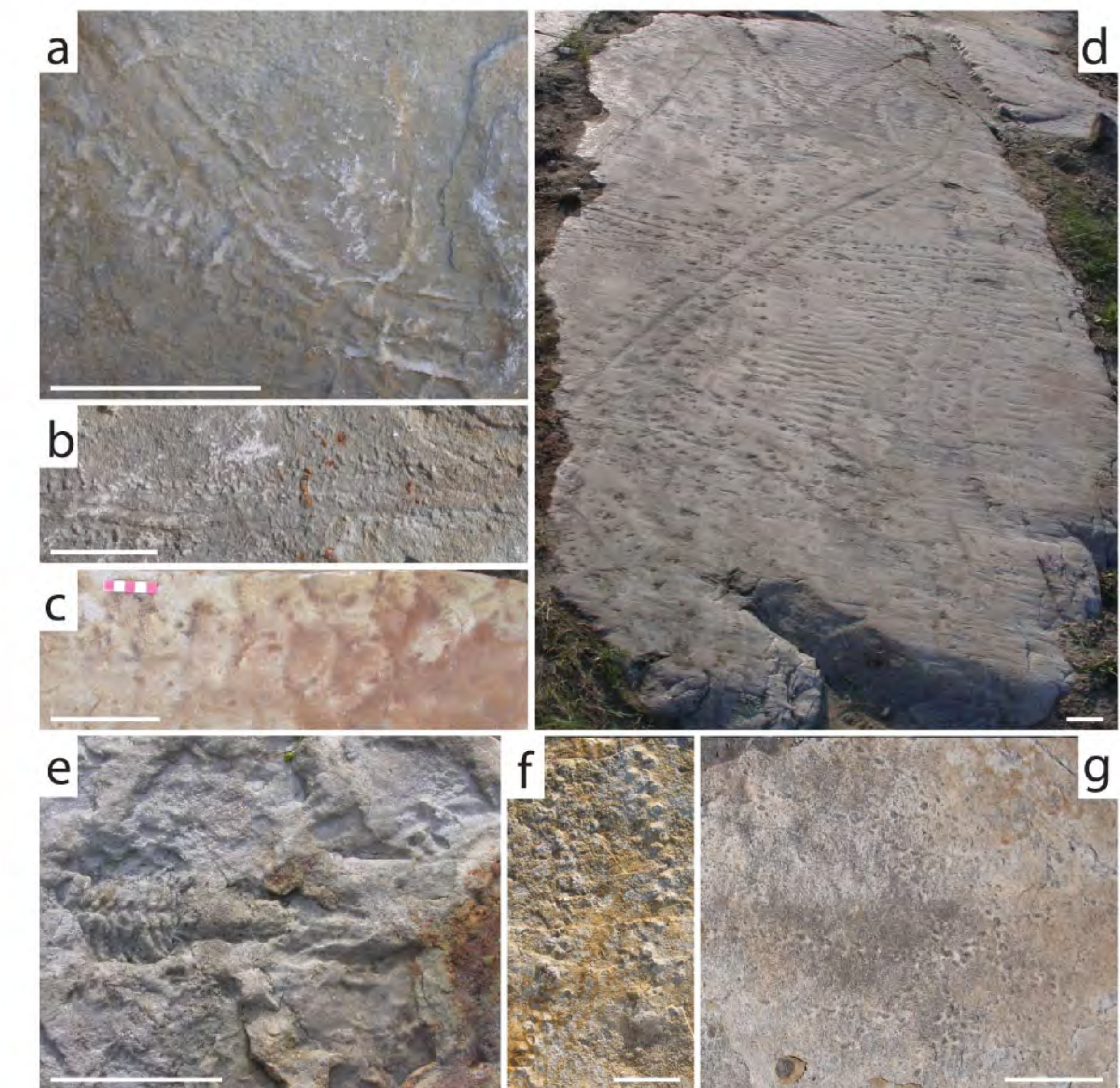


Above: Subaqueous and intrastratal sedimentary structures are common in the Keeseville Fm., and include (a) load structures, (b) contorted and intralastic bedding, (c) interference ripples, (d) oscillation ripples, (e) megaripples, and a variety of parallel to quasisipoloidal syneresis cracks visible in cross-section (f) and plan-view (g-i). Images a, g, h are bed soles, b, c, d, e, i are bed tops, and f is a cross-sectional view. Scale bars = 10 cm.

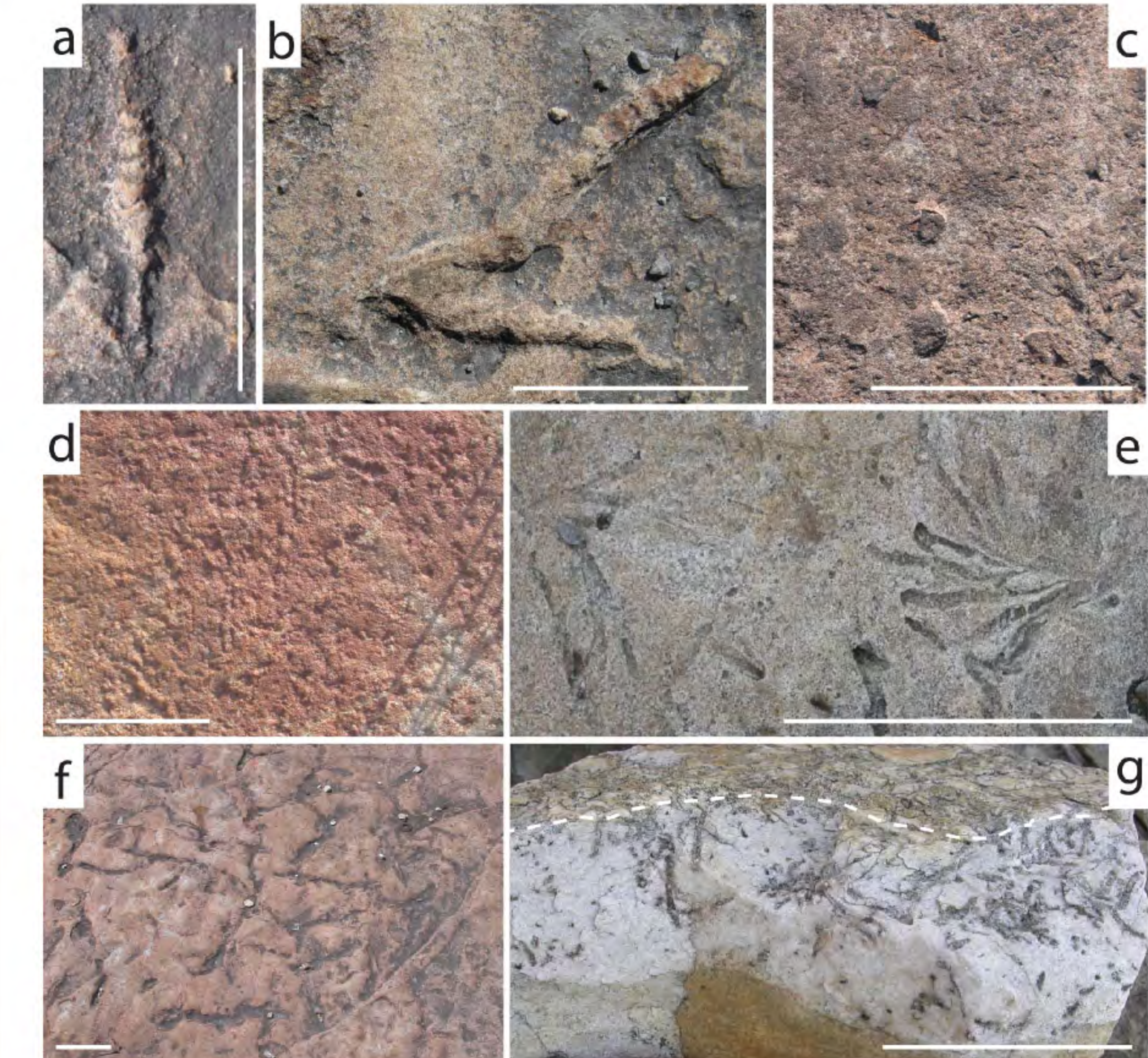
GEOLOGIC CONTEXT



Above: Regional geologic and stratigraphic context for exposures of the Potsdam Group near the city of Beauharnois. Measured section (second from the right) is at the *Protichnites* type locality of Owen (1852), and section at far right is at the Union Carbide quarry trackway site (see photomosaic at top center of this poster).



Above: Arthropod trackways include preservational variants of *Protichnites*, such as forms with (a) continual medial and lateral furrows, (b) continual medial furrows flanked by discrete tracks, and (c) intermittent medial furrows flanked by discrete tracks. Many bedding planes (d) contain individual trackways that exhibit all of these features. Mottled furrows (e) may include the tracemaker (left) at the termination of a *Didymaulichnus* furrow (right). Undertrack preservation (f) and bed-top preservation (g) of *Diplichnites* is common, indicating arthropod locomotion in which the tail/abdomen was not in contact with the substrate. Bed soles (a, b, e, f), bed tops (c, d, g). Scale bars = 10 cm.



Above: Burrows include (a, b) spreiten bed-parallel forms akin to *Scalarituba* or *Nenoxites*, (c) shallow *Arenicolites*, (d) unidentified forms similar to *Torrowangea*, (e, g) radiating probes similar to *Phycodes palmatum*, and shallow non-spreiten forms interpreted as cf. *Teichichnus*. Dashed line in (g) is the bedding plane and lower area is a cross-section of the *Phycodes*-burrowed bed. All other images are of bed tops. Scale bars = 10 cm.

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