

New Fossils of the Oldest Animals from the Northwest Territories, Canada

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FIGURE 1



SCIENTIFIC QUESTION

Fossils of the Ediacara Biota (~580-539 Ma; Fig. 1 illustration by Alex Boersma) represent the oldest unambiguous evidence for animals. Thus, they preserve an unparalleled view into the advent and diversification of life on Earth with significant implications for the range of conditions likely to host similar forms beyond our planet. Perhaps most limiting in our current understanding of Ediacaran evolutionary change is the availability of abundant and diverse macrofossils. **More than 75% of the Ediacara Biota is represented by just four localities globally.** The most impactful method to try and reduce such uncertainties is to search for early animals in underexplored regions around the world.

APPROACH

The goal of this work was to document and describe the relatively unexplored record of Ediacaran fossils from the Yukon and Northwest Territories, Canada (Fig. 2) and incorporate findings into global patterns of evolutionary change in early animals. Although research in the region has been ongoing for over 40 years, to date, only a handful of Ediacaran fossils have been described from rare sites, likely due in part to the extremely remote nature of the region (e.g., requiring helicopter access). Preliminary work in recent years demonstrates that sections throughout the region (grey box in Fig. 2) contain abundant and diverse evidence for early animals. Further, these are found in distinct environmental settings with reliable radiometric ages, which is highly unique for Ediacaran fossil sites. PI-Evans and collaborators visited sections in the Northwest Territories in the summer of 2024 and identified several new fossil taxa. In addition, PI-Evans investigated specimens collected in 2022 and 2023 from the Yukon. This work documents a high diversity and abundance of fossils in the region, including age diagnostic and entirely new species.

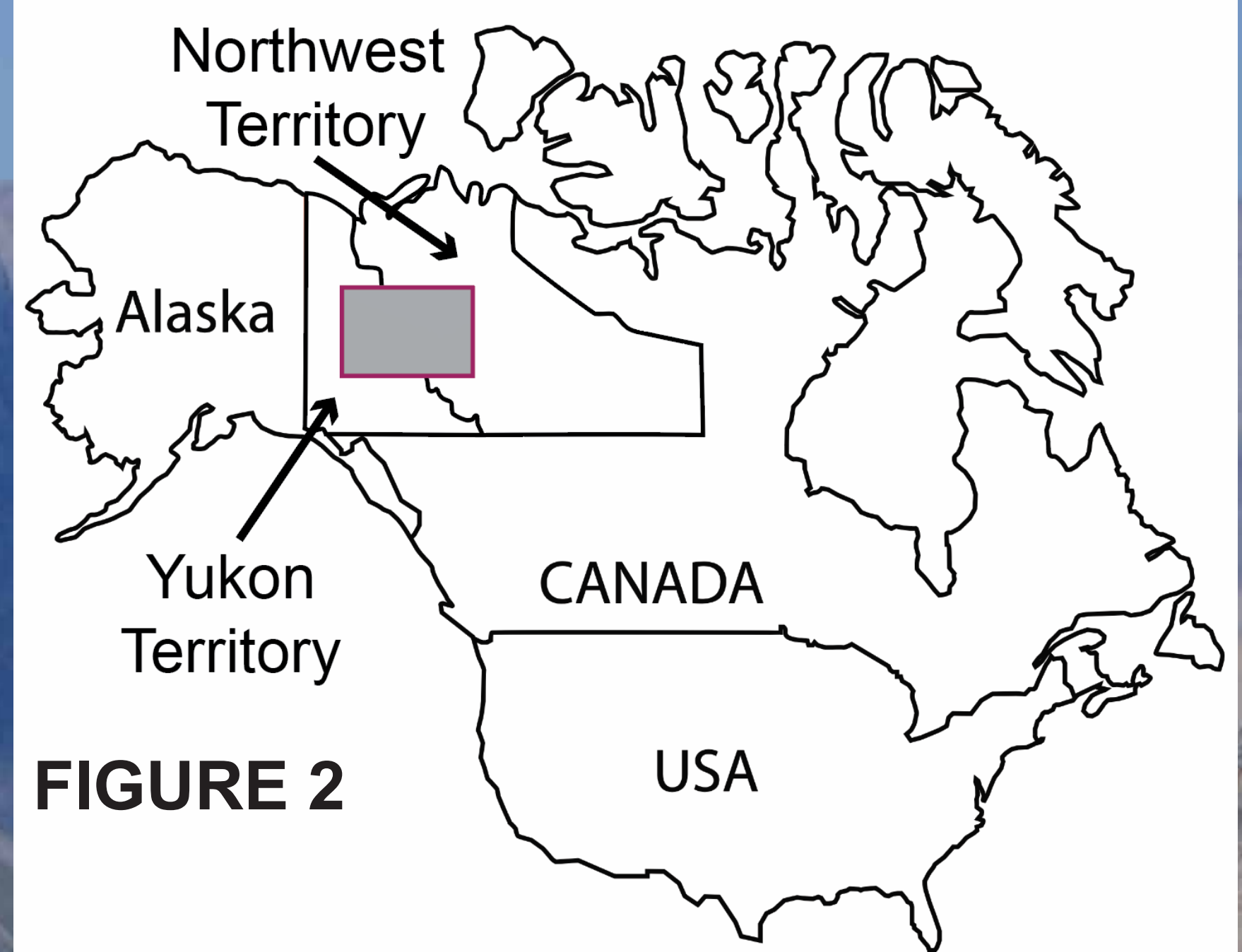
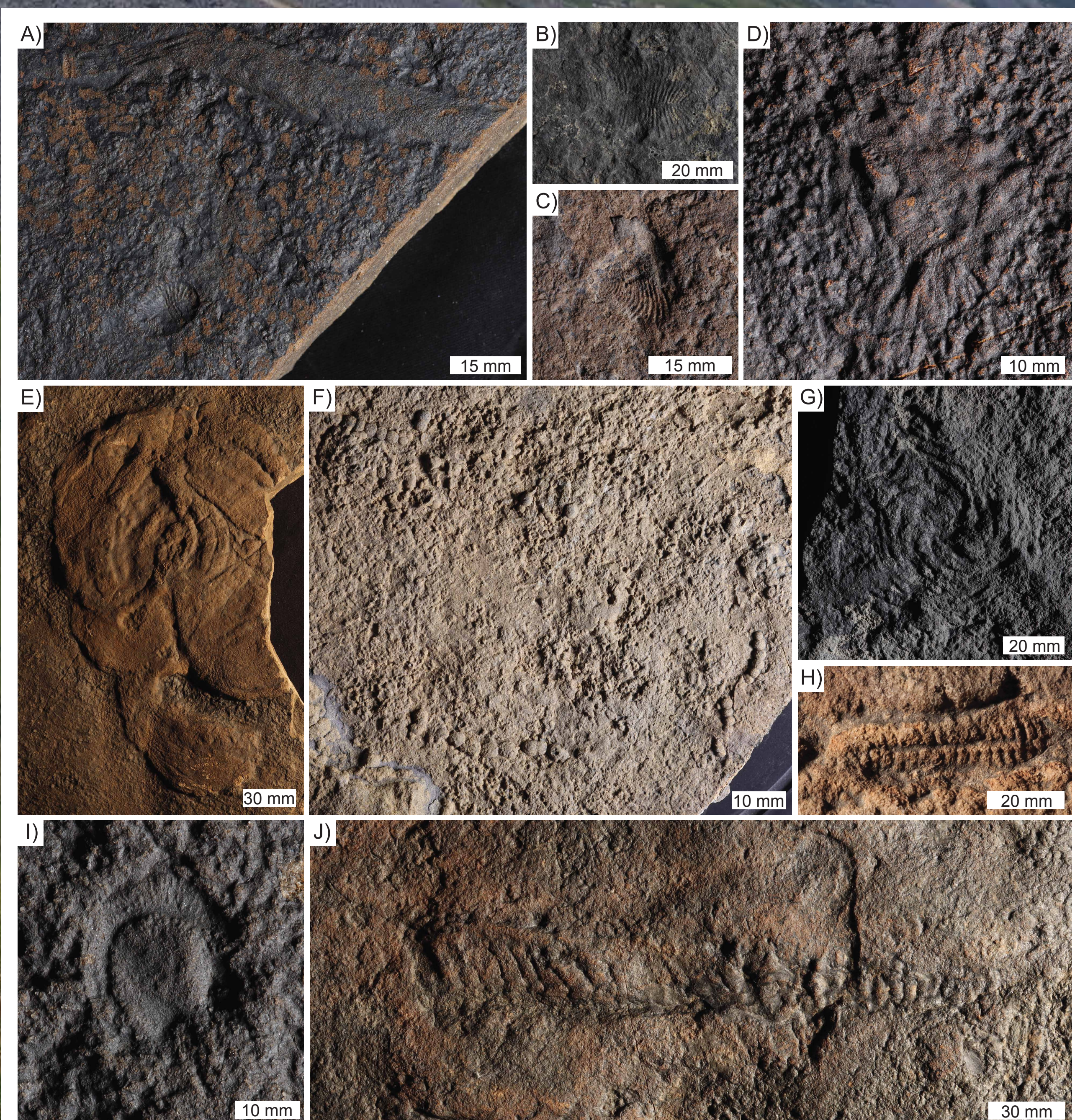


FIGURE 3



RESULTS

Work during the summer of 2024 resulted in a host of new discoveries from NW Canada (Fig. 3), including:

(A-C) *Dickinsonia*: perhaps the most iconic fossil of the Ediacara Biota and one of the oldest motile animals, previously known from Australia, China and Russia.

(A) *Aulozoon*: a tubular organisms, previously considered endemic to the Flinder's Ranges, South Australia.

(D) *Eoporpita*: a possible anemone, previously hypothesized to have been present in NWT based on a single, poorly preserved specimen.

(E) *Mawsonites*: the holdfast of a large frondose organism, previously considered endemic to the Flinder's Ranges, South Australia.

(F) *Funisia*: modular and tubular organisms that preserve the oldest evidence of sexual reproduction, previously considered endemic to the Flinder's Ranges, South Australia.

(G) *Eoandromeda*: a possible ctenophore, with 8 radially arranged arms, one of few Ediacara taxa known from both South China and South Australia.

(H) *Pteridinium*: three-dimensionally preserved, boat like organism, previously hypothesized to have been present in NWT based on a single specimen.

(I) *Kimberella*: an early mollusc with a muscular foot and proboscis for scratching away at the organic mat, previously known from South Australia and Russia.

(J) *Arborea*: exceptionally well-preserved specimen.

These finds establish that abundant and diverse fossils exist in NW Canada, more than doubling the previously suggested number of species, and confirming that they are equivalent to the global White Sea Assemblage (~555Ma).