

The Burgess Shale: a unique Cambrian fauna

from R.A. Fortey

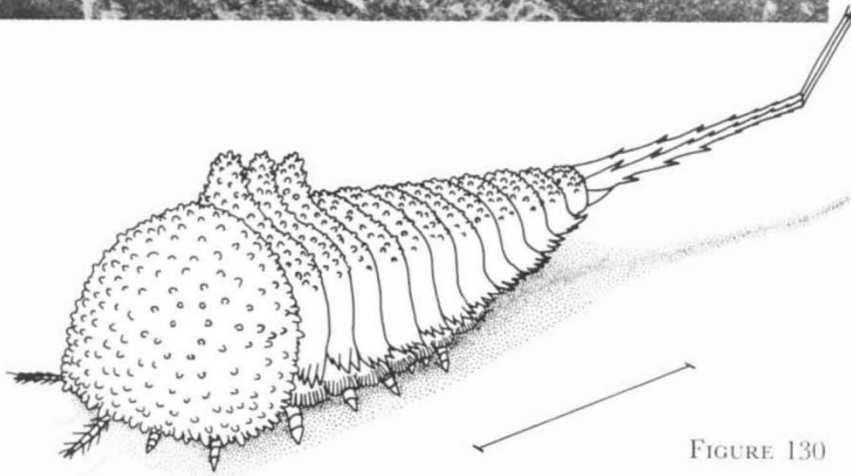
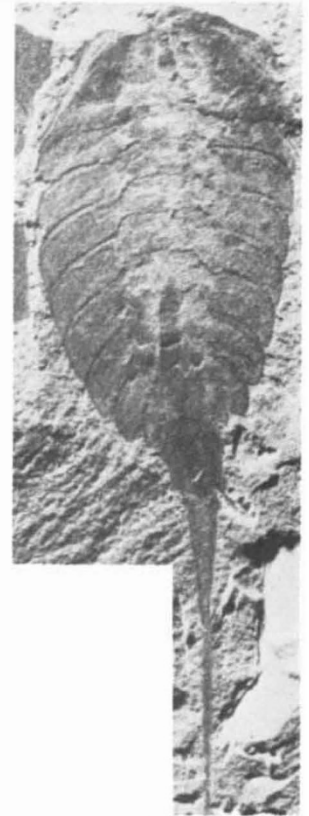


FIGURE 130

Habelia optata. Above, fossil from the Walcott quarry. $\times 4.6$. Below, reconstruction in oblique anterior view, suggesting the animal walking on the sea bottom.

Molaria spinifera. Fossil from the Walcott quarry. $\times 5$.

THE fossil record is usually very selective, preserving only the remains of well skelitized animals. Soft tissues decay and leave no trace, and many groups of organisms lacking tough, preservable shells or skeletons have virtually no fossil record as a consequence. There are extremely rare cases where the rocks have preserved impressions of delicate limbs or internal organs, as well as of different kinds of worms and other organisms otherwise unknown as fossils. The importance of such occurrences is enormous in fleshing out the full complexity of organic evolution.

Probably the most significant of these 'geological miracles' is the Burgess Shale in British Columbia, of middle Cambrian age (about 550 million years BP). The locality was originally described by the great American palaeontologist C.D. Walcott in the earlier part of this century.

Walcott named a whole array of amazingly well preserved fossils: 'worms' and sponges, and an astonishing variety of arthropods, as well as a number of enigmatic fossils which could not be assigned readily to any known group of animals. This fauna is now under a thorough re-examination (with much new material from British Columbia) by a team of scientists led by Professor H.B. Whittington of Cambridge University. The illustrations here are from the latest, and one of the last, parts of this reconsideration.

What is most surprising about the new results is that the puzzles have, if anything, multiplied. Very few of the arthropods can be simply related to groups still living. More often they show curious combinations of features — many of them primitive, but some specialized in odd ways — that make their

classification a delicate business, to say the least. Some even have body segmentation resembling one group of arthropods, but limbs more like another! It is certain, however, that the arthropods must have had a complex history before the middle Cambrian. Some of the 'worms' are members of living groups: in one case their Cambrian diversity was far greater than at the present day. But there remain a number of bizarre, soft-bodied animals which defy ready classification with any of the major groups of living animals. There has even been the suggestion that these are the lone records of phyla of animals which have not survived — unless they are still lurking undiscovered somewhere in our oceans.

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of this index obtained when the two individuals come from the same 'race' with that obtained when the two are members of different 'races' gives a clear indication of the degree to which the human population is divided into genetically different groups. His analysis shows that by far the largest component of the total genetic diversity of mankind — about 84 per cent of all genetic variation — results from the genetic

differences which exist between individuals belonging to the same tribe or nationality. About six per cent arises from differences between tribes or nationalities (such as those which are found, for example, between the populations of France and Spain, or between different tribes in the east and west of Africa). Only about ten per cent of the total biological diversity of mankind arises from genetic divergence

between 'racial' groups. In other words the genetic differences between the classically described races of man are on the average only slightly greater than those which exist between nations within a racial group, and the genetic differences between individual human beings within a local population are far larger than either of these. Mankind as a whole, far from being divided into a number of discrete entities which could be