

and the vicinity of the Baltic, has few species of *Phylloceras* and *Lytoceras*, and very many of *Harpoceras*, *Oppelia*, *Peltoceras*, and *Aspidoceras*, and coral reefs have great extent. The north Russian or Boreal province has in its Jurassic rocks no species of *Lytoceras*, *Phylloceras*, and *Haploceras*, and no coral reefs, while those of *Cardioceras* and *Aucella* are widely distributed. On the other hand, the flora of the earliest part of the following Cretaceous period in Greenland included an abundance of *Cycads*.

Although the cold of the Atlantic and Pacific barriers of North America was manifestly of little severity, it was enough for wide results in the geographical distribution of species.

The Mexican Gulf was a source of warm waters for southern and interior North America, while at the same time the Arctic seas may have sent down polar currents over its northwestern interior during the Triassic period. The effects of the cold northwesterly currents of the Pacific border are plainly seen in the many species peculiar to that coast, and prominently in the *Aucellæ*, which are related to the Siberian species.

BIOLOGICAL CHANGES AND PROGRESS.

Some of the Successional Lines.

It is noteworthy that the new types of the Jura-Trias did not appear at equable intervals successively along the era. They were rather evolving in its commencing part, the Triassic, the opening period of Mesozoic time. The Triassic period is thus, after the Cambrian, which opened the Paleozoic, the most eventful in the earth's biological history; that is, the most productive of great branchings in the higher departments of the Animal Kingdom — the type of Mammals, that probably of Birds, and those of each of the grand divisions of Reptiles excepting such as had already appeared in the Permian. This is true also of the modern, or nearly modern, style of Orthopters, Neuropters, and Coleopters among Insects, as illustrated by Scudder; and the Lias completed the display of the system of Insects by the introduction of the Dipters or Flies, and of Hymenopters as represented by Ants and other families. It is to be admitted, however, that part of the developments indicated by the relics in Triassic beds may date from the Permian. The physical change of a purified atmosphere prepared the way for terrestrial life; and the preparation was essentially complete before the close of the Permian.

This crowding together of the origins of so many types in connection with the barrenness of most Triassic regions makes it doubtful whether facts illustrating the precursor lines will ever be fully made out.

As regards the precursors of Mammals, their closer relation to Amphibians than to Reptiles is proved, as Huxley first pointed out, by the fact that Amphibians and Mammals have two occipital condyles, and Reptiles and Birds but one; and hence their derivation was almost certainly from some Amphibian type, and not from a Reptilian. The Monotremes (of which but