

THE TAPHONOMIST'S CORNER

DISSOCIABILITY OF THE FOSSIL RECORD



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In attempting to identify issues and trends in research on taphonomy of fossils and rocks, I would like to place my remarks in a palaeontological topic of stratigraphic and geological interest, related to the nature of the fossil record: the dissociability of the fossil record.

Palaeontology has become an applied science in stratigraphy and geology through the usefulness of the fossils in the interpretation of the geological record. The most widespread geological application of palaeontology has been in the dating and chronocorrelation of strata through their fossils. Taphonomic, palaeobiological and biochronological data are relevant in interpreting time-space relationships of fossiliferous rocks, and they are of biostratigraphical, chronostratigraphical and geochronological interest. Furthermore, palaeontology and fossils are also valuable in palaeoenvironmental interpretations. Taphonomic and palaeobiological data are relevant in interpreting palaeoenvironmental conditions and changes, and so they are of stratigraphic and geological interest. For example, taphofacies models relate preservational features of fossiliferous deposits to palaeoenvironmental parameters. Stratigraphic and palaeontological data obtained from the geological record, concerning changes in substrate consistence, sedimentation rate, sediment accumulation rate, turbulence water and bottom-water oxygenation, among other parameters, may provide insights into palaeoenvironmental changes. However, it is important to distinguish between stratigraphic and palaeontological data, as well as between the stratigraphic record and the fossil record. The fossil record provides taphonomic, palaeobiological and biochronological information, allowing the development of diverse scientific branches of palaeontology. Taphonomy studies fossilization processes and results, palaeobiology studies palaeobiological entities, and biochronology studies time-space relationships of fossil and biological entities of the past. However, a particular feature of the fossil record may condition the validity of palaeontological interpretations. The fossil record shows stratigraphical disorder. At the present time, palaeontological interpretations cannot

suppose that the detailed (bed by bed) order of succession shown by the fossils in the stratigraphic record represents the chronological order of the producing taxa. Fossils from the same stratigraphic level may represent successive palaeobiological entities. For example, remains of chronologically successive organisms or taxa may occur in the same stratigraphic level, forming condensed assemblages. And fossils contained in successive stratigraphic levels may not represent successive palaeobiological entities. For example, remains of the same organism, population or community may occur in several successive stratigraphic levels. On the other hand, palaeontological interpretations cannot assume that fossils and rock bodies of the same geological interval represent neither the same time interval nor the same palaeoenvironment. The fossil record and the stratigraphic record at a geological interval may represent different time-intervals and separate palaeoenvironments. The fossil record may supply relevant data on palaeoenvironments and processes, which have left no traces in the stratigraphic record. For example, the Jurassic ammonoid illustrated in sagittal section in this figure shows several phases of cementation and sedimentary filling within the chambers of the phragmocone, which were formed in several successive sedimentary environments. Consequently, *the fossil record and the stratigraphic record should be considered as two dissociable components of the geological record*. At the present time, stratigraphy and palaeontology can develop an integrated conceptual system useful to analyse both the stratigraphic and the fossil records, and within which it is possible, independently, to interpret and test the diverse components of the geological record.