author of the other four papers which relate to studies of parts of the British
coast have set their work in a broader context. These papers provide accounts of: 
sediment mobility and erosion on a
multibared foreshore in S. W. 
Lancashire (W. R. Parker); cyclical
changes at the entrance to Teignmouth 
Harbour, Devon (A. H. W. Robinson); a
Holocene chenier plain in Essex
(J. T. Greensmith and E. V. Tucker);
and suspended sediment transport and deposition over the intertidal flats of the
Wash (G. Evans and M. B. Collins). The
only case study from outside Britain, of
marine bars in Kouchibouguac Bay,
New Brunswick by B. Greenwood and R.
G. D. Davidson-Arnott, concludes with an
evaluation of the specific results in the
light of other studies of bar genesis and
migration.

Apart from one brief contribution on coastal engineering problems the
papers in the book fall into two groups: those discussed above are essentially
sedimentological and geomorphological. The other four papers approach the
critical problems of the nearshore zone from a more theoretical,
hydrodynamic viewpoint and deal with
waves and wave generated currents. P.
D. Komar considers the two modes of
generation of longshore currents - by an
oblique wave approach to the shore line and by longshore variations of wave
breaker height, and D. A. Huntly and A. J.
Bowen compare the hydrodynamics of
sleep and shallow beaches. P. Holmes
outlines methods of evaluating wave characteristics appropriate to the
computation of littoral transport, and P.
H. Kemp evaluates the effects of wave asymmetry in the nearshore zone and
breaker area.

Taken overall, the book is a useful
collection of papers which provides a
sense of the complexity of the problems of the nearshore zone and indicates
some of the ways in which research is
progressing.

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The Study of Trace Fossils

Edited by Robert W. Frey
$57 80

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This book was in the works a long time, and its publication was eagerly awaited
by those of us interested in trace fossils.

One thing that strikes the reader
immediately on picking up a copy of this book is the intriguing dust-cover photo: a
human footprint which, to the viewer's
surprise, turns out to have six toes! The
genesis of this strange print is not
explained in the text; Frey frustrates us
by thanking R. G. Bromley for the cover
photo, and directing further inquiries to
him.

In a way, that photo is symbolic of a lot
of the significance of the study of trace
fossils (also known as ichnology). Trace
fossils are often mundane phenomena such as footprints or burrows, which
sometimes may be attributed to a
specific organism. All too often, however, trace fossils which we
supposedly had under control either
show up in the wrong place, or develop strange modifications, for example, a
Zoopycos in the intertidal, a "shoreline
indicator" shrimp burrow in abyssal
sediments, and a sixth toe on a human
footprint. Frey's book is the first attempt
to chart an integrated pathway through the
pockmarked, burrowed and fecal pellet-laden landscape of trace fossils.
The rationale of the book is set out in
the prelogue: rather than being a
collection of papers on trace fossils, it is
a genuine cooperative approach by a
number of specialists to the study of
trace fossils, emphasizing relationships with other disciplines. The book is
organized into five major parts, with
chapters written by most of the well-
known workers in trace fossils and
animal-sediment relationships. Part I:
Introduction to Ichnology, contains
chapters on the history and scope of
ichnology, classification and
preservation of trace fossils, and (a very
useful, cautionary addition) false or
misleading traces. Part II, The

Geological Significance of Trace
Fossils, discusses aspects of their
paleontological, stratigraphical,
sedimentological and paleoecological
significance. As in Part I, most of this is
review material, albeit comprehensive,
well-written review. There are some
interesting observations in this section.
Crimes points out that trilobite traces
(often of a relatively simple nature)
commonly occur well below the first
occurrence of trilobite body fossils, and
suggests that this is evidence for early,
soft-bodied trilobites (although it seems
to me that the tremendous hurdle
involved in going from the brachiopod
skeleton of the presumed polychaete-
like ancestor to the external skeleton of
the arthropods is not sufficiently
discussed). Howard emphasizes that
trace fossils are sedimentary structures,
often containing valuable information on
deposition rates and sediment
characteristics, and Rods discusses
how trace fossils may allow us to
postdict factors such as salinity,
temperature, dissolved oxygen and
mass properties of the sediment. This
section basically emphasizes what is
becoming apparent: the use of traces as
guide or index fossils is limited, and
hampered by lack of sufficient studies in the
geologic record; on the other hand,
traces as facies fossils are beginning to
assume an importance greater, in many
cases, than body fossils.

Part III, Selected Groups of Trace
Fossils, contains a systematic review of the
major groups of trace-producing
organisms. This section contains some
extremely interesting, even provocative,
chapters. To choose a few from many:
Serjeant discusses plant trace fossils,
and Voorhies vertebrate burrows; a
fascinating chapter on "unusually large
Burrows" by Bromley, Curran, Frey,
Gutnick and Sutnner, describes
burrows for which we must seemingly
postulate organisms up to nine m long,
and only a half-centimetre in diameter!
(Nemertean seem the only possible
modern organism capable of assuming
these dimensions.) The section
concludes with related papers by
Kennedy and Bromley, on the general
topic of hardgrounds - a subject of
increasing interest.

Part IV, Recent Aquatic
Lebensspuren, could have been greatly
expanded, for it is specifically these
studies which allow us to develop trace
fossil models. Chamberlain has a fascinating chapter on freshwater traces, Dorjes and Hertweck discuss some of the fine work on shallow marine environments being done by the Senckenberg Institute, and Hollister, Heezen and Nafe present a brief, largely pictorial review of deep-sea traces.

Part V, Techniques in the Study of Lebensspuren, concludes the volume with a chapter on experimental methods by Elders, which must be the only discussion of burrowing by means of a hydraulic skeleton which neglects to refer to Clark (1964), and a useful omnibus techniques chapter by Farrow.

In general, the book is well-written and well-illustrated. Typographic errors are few, and an errata sheet is included, correcting some major omissions. It is difficult to decide what specific need this book fulfills. Copies should certainly be on every library shelf, and in the collections of most paleontologists. The book is a review volume, however, containing little that is new or startling to workers in the field. Many of the illustrations are reprinted from previously-published work. The main value of this book would seem to be as a supplementary reference for upper-level undergraduate courses in paleontology and sedimentology. Any professor suggesting that his students pay more than $60 for a supplementary text runs the risk of becoming a thin carbonaceous film.

The Study of Trace Fossils is a necessary and timely work, coming at a time when scientists in other discipines are beginning to appreciate the sort of data available from ichnological research. Many of the chapters, especially those by Howard, Rhoads, Chamberlain and Dorjes and Hertweck, also reinforce one of my own opinions, that the main value of the study of fossil and recent traces lies in the future. Much of "marine biology", especially density distributions and animal-sediment relationships, is now studied by geologists. I look forward to seeing more work on things like nutrient cycling, pollutant dispersal, and hydrocarbon reserves being done by scientists who refer to themselves as "ichnologists".

References

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Geological Hazards

By B. A. Bolt, W. L. Horn, G. A. Macdonald, and R. F. Scott
Springer-Verlag, New York, Heidelberg, Berlin, 328 p. 1975. $25.80

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This book deals with major geological events which are hazardous to mankind. It is divided into eight chapters that consider hazards from earthquakes, volcanoes, tsunamis, landslides, ground subsidence, snow avalanches and floods, in order of presentation. This reviewer found the book to be well written, generally informative and even exciting in scope and method of presentation. Although the authors say the book has been prepared for the general reader and the college student at the introductory level, an advantage of basic geology is a definite advantage. The use of dramatic case histories adds an element of excitement to most chapters.

Chapter 1 (Bolt) presents a thorough summary of the many causes of earthquakes set in the proper perspective of plate tectonics. Interesting correlations and relationships between intensity and ground acceleration, rupture length and magnitude, horizontal to vertical acceleration ratios, attenuation curves, etc., add considerable depth to the generally descriptive presentation.

Chapter 2 (Macdonald) presents a longish but impressive portrayal of volcanic hazards with truly incredible statistics on resultant direct and indirect casualties. Volcanic mud flows derived from ash, tephra and rain or crater waters are most interesting as are the discussions of secondary hazards. One is left with a very pessimistic view of mitigation of volcanic hazards.

Chapter 3 (Bolt) on hazards from tsunamis lacks technical content to the great detriment to the chapter. Some clear explanations of the translatory nature of a tsunami is necessary to graphically explain how a one m high wave can "run up" to a 20 m height recorded for some of the world's great tsunamis. Terms used in the chapter are also poorly defined.

Chapters 4, 5 and 6 (Scott) deal with landslides, subsidence and snow avalanches and are the most technical in the book. The landslide and subsidence chapters are considered in terms of descriptive soil mechanics including the role of pore pressures and effective stresses. Although well done, the technical discussions are so brief and encompass so many variables that they are probably beyond those readers lacking some knowledge of mechanics. The technical approach is undoubtedly the correct one since the basic principle must be understood by those dealing with landslides in particular. The subsidence chapter is marked by a typographical error on page 207 related to the total and effective stresses and by the lack of discussion of subsidence by both salt dissolution and sand grain crushing at contact stresses in excess of grain strength. The reference lists are notably weak in all three chapters.

Chapter 7 (Horn) on flood hazards is a wryly amusing discussion of the many geological and meteorological variables that influence flooding. The effects of rainfall, snow-melt, drainage basin characteristics, frequency of occurrence are briefly described followed by an interesting section on techniques to alleviate or prevent major floods. The most interesting part of the chapter is the case history section which vividly portrays the real hazards of floods as comparable to earthquakes and volcanism.

Chapter 8 on hazard mitigation and control is far too brief to carry any impact. In fact, the section on insurance was more interesting than the section on risk and hazard maps. As a wind-up to a useful book, Chapter 8 is unsuccessful.

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