

ceptable in a research paper but not in a textbook.

Despite these blemishes, the book provides a well written, comprehensive account of the transport and optical properties of semiconductors, which should prove useful not only to 'senior or graduate' students, but also to research scientists in the area of semiconductor physics.

J. B. BIRKS

## Leukocytes collecting

*Chemotaxis and Inflammation.* By Peter C. Wilkinson. Pp. viii+214. (Churchill Livingstone: Edinburgh and London, 1974.) £4.

THERE is an analogy between the way in which research on leukocyte chemotaxis has been conducted and the movement of leukocytes themselves. For years there was more or less random observation by pathologists, bacteriologists and immunologists, who reported chemotactic activity for neutrophils or mononuclear phagocytes in a variety of products of bacterial growth, tissue injury and immune reactions. A distinction was made between cytotoxins, which themselves stimulate the directional movement of cells, and cytotoxicins, which bring about a chemical change in non-chemotactic molecules, usually serum constituents, as a result of which cytotoxins are generated. From all this work a long list of chemotactic factors has accumulated, some of which are controversial.

Two technical innovations improved the quality of research in this field. One was the introduction of the Boyden chamber and developments of it which made observations on chemotaxis more quantitative. The second was the availability of new methods for purifying chemotactic factors such as complement components. At present research on chemotaxis is gaining fresh impetus. Random activity and accumulation of miscellaneous observations is now being replaced by studies directed towards the purification and characterisation of cytotoxins and ascertaining how they act on leukocytes. Although the progress so far made is limited, the direction is obviously right.

Some cytotoxins, such as  $\alpha_2$ -casein and the cleavage products of complement components, C3a and C5a, have been identified and quite a lot is known about the chemical composition of casein and C3a. The first steps have been taken towards defining the physico-chemical properties of a molecule that make it cytotoxic. Wilkinson's own research on the generation of chemotactic activity when proteins are denatured or coupled with acid anhydrides or other groups is a contribution in this direction.

It seems as though basic peptides

with specific conformations, such as the arginine-rich C3a, or proteins with rather high concentrations of surface non-polar groups, such as  $\alpha_2$ -casein and denatured or substituted proteins, are cytotoxic. Possibly the former interact with and cluster certain acidic glycoproteins in the surface of the leukocyte whereas the latter penetrate into the membrane of the leukocyte. Both could increase the permeability of ions, such as calcium, through the leukocyte membrane, thereby triggering chemotactic responses.

Books on chemotaxis are out of date and out of print. This year will see the publication of two books on chemotaxis, a multi-author volume edited by Sorokin and the shorter monograph by Wilkinson under review. The latter is a well written introduction to the subject which will provide enough information for all but specialists. Scotland is neutral ground in the skirmishes that have sometimes developed between Switzerland and the eastern seaboard of the United States, and Wilkinson provides a balanced appraisal of the situation. Where available information is confusing, such as in the role of cyclic nucleotides in the responses of leukocytes to chemotactic factors, this is plainly stated. Perhaps observations on activation of guanylate cyclase, too recent to be included by Wilkinson, will help to resolve the problem.

In any case, there is current interest in the motility of cells, which depends on an actomyosin system similar to that in smooth muscle, on mechanisms by which attachment of various substances to plasma membranes can trigger cellular responses and on the behaviour of embryonic and other cells in concentration gradients. These developments in cell biology should soon be applicable to chemotaxis. Wilkinson's book provides a useful summary of the first fifty years of research on chemotaxis and can also serve as an introduction to the next phase of development. Perhaps it will stimulate cell biologists to use leukocyte chemotaxis as a model system which is of interest in itself and also relevant to medicine.

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## Climatic change

*Éléments de Paléoclimatologie.* By Raymond Furon. Pp. 216. (Sciences de la Terre.) (Librairie Vuibert: Paris, 1972.) n.p.

THERE is a clear need for a new objective, systematic review of palaeoclimatology, but Furon's contribution, instead of improving on the three main books is more likely to retard this interdisciplinary science. It commences with a chapter of statements about the characteristics of present climatic zonation, but without emphasising the underlying

causes, and is followed by an inadequate outline of uncomprehended theories that could cause climatic change. Forty-nine pages are given, according to the title, to methods of palaeoclimatology. They turn out to be seriously incomplete yet space is wasted returning to arguments about continental drift instead of making necessary qualifications to bald statements such as striated and polished stones proving a glacial origin; illite, mica and feldspars in shales associated with Carboniferous coal being incompatible with a humid, tropical climate; and so forth. The objective evaluation of climatic indicators should be possible irrespective of the status of theories of the Earth's surface evolution.

The second section comprises five chapters dealing with different time spans which contain patchy lists of stratigraphic features, only some of which are of palaeoclimatic usefulness—for example, the thickness of Mesozoic volcanics in Mozambique is surely less climatically significant than the coral reefs of the North American and European Permian that are neither mentioned nor shown on a map purporting to show their distribution. Despite his own warnings, the author interprets all occurrences of *Gangamopteris* and *Glossopteris* as indicating warm, humid conditions, and the interbedded glacial debris as always from mountain glaciers associated with an unexplained 300 million year climatic cycle of ice ages. He admits, however, to being "un peu troublé" by the absence of glacial evidence from continents north of the Tethys and sprinkles the section dealing with the Carbo-Permian of Europe with "climat chaude", "chaude et humide", and so on, sometimes based on the presence of evaporites, but often without specifying the evidence. Luckily, the data are plotted on maps using the present geography and so avoid arguments about reconstructions, which Furon disbelieves, and which even those on the plate-tectonic bandwagon must still regard as subject to review.

The 16 palaeoclimatic maps are regrettably small, less than 12 × 8 cm, so that symbols (often only one or two per map) often overlap areas far distant from the actual outcrop and are all the same size, irrespective of such factors as the thickness of the evaporites represented. There is no index, but quite long bibliographies follow each chapter. This arrangement leads to repetition, so that Furon's *La Paléogéographie* is listed five times but Termier and Termier's *Atlas de Paléogéographie* only appears once and Harland's work on the late Precambrian is not mentioned anywhere. Nonetheless, the bibliographies are the most useful part of this unsatisfactory book.

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