Book reviews

continue to get their agriculture working again? Or is it too late anyway to repair the damage of drought, neglect and overexploitation of the land?

Robert Burton, naturalist and author

Milkweed Butterflies

P.R. Ackery and R.I. Vane-Wright
British Museum (Natural History), 1984, £50·00

The milkweed butterflies (Danainae) comprise a small subfamily of the Nymphalidae containing about 150 species worldwide. Their common name derives from the usual host-plants, the milkweeds (Asclepiadaceae and Apocyanaceae), plants with a milky sap that may contain substances poisonous or distasteful to many animals. By poorly-understood mechanisms, milkweed butterflies selectively store such toxins in their bodies and thus themselves become distasteful to predators. Most milkweed butterflies are tropical in distribution and, although they are not especially diverse, their chemical protection allows them to form a conspicuous and important part of butterfly faunas.

The full title *'Milkweed Butterflies—their Cladistics and Biology* is described in a more 'user-friendly' style on the title page as '. . . an account of the natural history of the Danainae . . .'. What a relief it is to see the systematics of a group of insects being presented in a readable, absorbing and yet comprehensively authoritative style! To be sure, the authors could hardly wish for finer material with which to work, the breadth of behavioural and physical adaptations within the group is quite stunning. The courtship patterns of *Danaus* and others, in which 'love-dust', in the form of special scent-bearing scales from the male's wings, is puffed onto the female's antennae, makes the fumbling and posturing of vertebrates seem very gauche. The migrations of the North American monarch butterfly, culminating in mass roosts in California and Mexico, are now well known as one of the wonders of the natural world.

Research on the milkweed butterflies has proceeded for about a century-and-a-half; Ackery and Vane-Wright have, themselves, taken almost a decade to summarise, interpret and commit to paper the accumulated data. The time spent is reflected in the quality and polished style of the book. In reading the pages one feels a sense of history unfolding: Henry Bates pondering over the mysteries of mimicry in the butterflies of the Amazon jungle, Alfred Russel Wallace extending those ideas to the Orient and considering natural selection. The protection incurred by unpalatable chemicals was long suspected to be the reason why other species mimic milkweed butterflies, but it was not until the 1960s that toxic cardenolides and alkaloids were isolated, capable of inhibiting the action of vital nerve and muscle enzymes. Since then, the science of ecological chemistry has expanded and the exciting story of co-evolution between plants and animals has continued to unfold. The biological arms race of the natural world is not only a driving force in

Amauris niavius, showing the abdominal brushes, which, when in contact with the hindwing patches, produce sex-pheromones *(P.R. Ackery)*.

Male *Danaus genutia* 'feeding' on *Crotalaria retusa* to obtain pyrrolizidine alkaloids, precursors of major components of their sex-pheromones. This behaviour, which is independent of 'normal' feeding, probably contributes towards their unpalatability *(P.R. Ackery)*.

evolutionary processes, but is now recognised as a valuable factory for compounds with potential medical value for mankind.

Enchanting though the biological and behavioural descriptions are, the sections on cladistics (a study of relationships using nested sets of characters to produce a systematic classification), nomenclature and identification are the essential utilitarian core of the book. The catalogue will remain a primary reference source for many years, and yet, by including under each species paragraphs on distribution, mimicry, larval foodplants and adult attractants, some of which are incomplete, the reader is implicitly given an opportunity to contribute more data. The identification keys are clearly laid out and supported by 120 pages of figures and plates, some in colour, including eggs, larvae, pupae, adults and dissected genitalia.

Perhaps of most interest to *Oryx* readers is the section on faunistics, in which a careful consideration of conservation has been included. Based on the detailed review of distribution, it has been calculated that the conservation of the danaines of just 31 selected territories would ensure the survival of representative populations of all 157 species. Most of these 31 'critical faunas' are located in islands of the Indo-Pacific region, including 11 Indonesian islands, several parts of the Philippines, Papua New Guinea and other islands in Malesia and the south-west Pacific. Islands in the Indian Ocean and the Caribbean, together with a handful of mainland continental countries, make up the remainder. Whilst the authors stress that the omission of countries from the list is no excuse for disregarding local conservation needs, the 'critical faunas' indicate centres of diversity and give valuable guidance in the disbursement of limited international conservation resources.

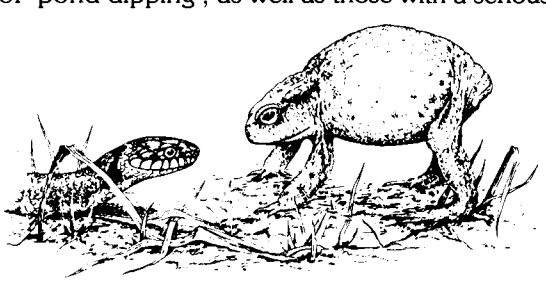
In the recent years of economic recession, taxonomy in Britain has been reduced, and staff and subject matter have been under careful scrutiny. Insects are so diverse and entomologists so few that decisions on priorities have had to be taken. Basic, or curiosity-driven, research is often the first to go, allowing strategic, or applications-driven, research to continue. But the definition of strategic (or applied) research is not always simple and requires careful consideration. Conservation, with its history of rear-guard actions and highly charged debate, has not always been given serious consideration as an applied subject, particularly in entomology. Yet it is quickly coming of age as a scientific discipline. Recognition of the role of conservation in its partnership with development, in the sustainable exploitation of nature and in its many hidden benefits to mankind, has brought conservation studies to the fore. Milkweed butterflies are not serious pests, nor do they have any value in biological control, but they have attracted long-term systematic study because of their highly complex array of biological interactions with other animals and plants. They have the potential to be used as sensitive indicators of perturbations to their environment, and this book on their systematics and biology gives the baseline data needed to develop this. The analysis of critical faunas provides important new criteria for locating such conservation applications. *Milkweed Butterflies* is of a quality and pattern that will set new standards in entomological systematics for many years to come.

Mark Collins, IUCN Conservation Monitoring Centre, Cambridge

Frogs and Toads

Trevor Beebee
Whittet Books, 1985, £4·95

Frogs and toads follow robins and hedgehogs in the newest publication of the Whittet series on wild animals in Britain. Numerous delightful illustrations by Guy Troughton, and an informal but informative text, provide the perfect balance for those with only the occasional childhood memory of 'pond dipping', as well as those with a serious



Defence position of toad when confronted by a grass snake (illustration by Guy Troughton, from *Frogs and Toads* by *Trevor Beebee*).