to admit he was wrong ("... I took a very erroneous view of the nature and capabilities of the Fuegians").

Nonetheless, the diary entry does reveal why it is nowadays so acutely embarrassing to read most of the anthropological linguistics written in the nineteenth century. Language is what makes us human, but some are more human than others. Colonial exploitation (economic, cultural and religious) demanded that, in the great chain of being, 'primitive savages' should fall roughly half way between chimpanzee and bourgeoisie. Exponents of the theory of 'mental evolution' duly interpreted their observations to show that the speech of 'lower races' was mere jabbering, eked out by pantomime, and that their mentation consequently allowed neither abstraction nor generalization.

In the twentieth century, two basic facts put the damper on speculation about language origins. First, all extant languages have equal expressive power (although achieved by superficially distinct means); and second, the fossil record of the hominid line will not support reliable argument about the cognitive capacities of the brains that once inhabited those skulls. For the most part, the domain became the province of the dilettante. It must accordingly have required considerable chutzpa for a professional linguist to launch wholeheartedly into *Language and Species* as an earnest topic of extended research.

Derek Bickerton is professor of linguistics at the University of Hawaii. Much of his own fieldwork has been on pidgins (which may in some sense be 'primitive' or protolanguages) and their conversion into creoles (which are definitely 'the real thing'). A creole language "is what results when a pidgin, created by adults, is learned by the children of those adults." The interest of the transition lies in the observation that whereas pidgins are pretty much a jumble of words, creoles exhibit "the same type of structure as any other natural human language". The propositional meaning of an utterance in a pidgin must be 'guessed' on the basis of lexical semantics and the context of situation; but the determination of 'thematic roles' (who did what to whom) in a creole sentence is controlled by the formal principles and parameters of universal grammar.

If, as Bickerton (coherently, albeit controversially) argues, the "jump from protolanguage to language (can be made) in a single generation", the biological implications are strong and profound: the process of creolization becomes a laboratory in which we can see (in relatively 'pure' form) the innate predispositions that the child brings to language acquisition as a species-specific characteristic. The behaviourist alternative to 'nativism' — that a general purpose learning device 'induces' grammatical structure from a

rich input of exemplary instances — becomes decidedly unappealing if the features acquired are simply not there in the pidgin environment. In Bickerton's view, creoles are thus "an unusually direct expression (of the) capacity to recreate language in the absence of any specific model from which the properties of language could be 'learned' in the ways we normally learn things."

Language and Species sets this discussion in the context of Noam Chomsky's government and binding theory (the only serious account of syntactic structures that currently exists). Bickerton's lucid description of the theory serves to draw a fairly clear line between protolanguage and the full system. That demarcation permits Bickerton (with justification) to have his cake and eat it with respect to the evolution of language. The gestural devices that can be taught to apes, the 'language' of small children (under the age of two), and the 'invented' pidgins that allow communication between adult speakers of mutually incomprehensible languages seem to fall together as limited, yet extremely useful systems of representation and expression. But there is a qualitative Rubicon between that level of linguistic labelling and the formal syntactic properties that then emerge in the language of the older child and that characterize all natural languages, creoles included.

Bickerton can thus avoid the counterintuitive view that the capacity for language in the species developed wholly out of the blue whilst recognizing the abruptness of the transition to true language. That the notion of 'gradualism' in both the phylogenetic and the ontogenetic development of language has been a conspicuous failure does not imply that there is no functional precursor to act as a springboard to syntax. Yet Bickerton's "language biogram hypothesis", derived from his creole data, is actually a more extreme 'nativist' position than that adopted by Chomsky. Chomsky's 'selectionist' theory of language acquisition presupposes that the child is presented with the linguistic evidence required to set a parameter of the syntax to the value represented in the adult language to which he or she is exposed; but Bickerton seems to be claiming that creoles possess features for which there is literally no evidence in the linguistic environment. Concerning the neurobiology of such leaps, however, Bickerton can add little to the handwaving that has always been such a lamentable feature of attempts to go beyond description in this area.

It would be unfair though to conclude on that kind of negative note. The evolution of language is a fascinating topic, and insofar as we know anything about it, Bickerton's *Language and Species* is the best introduction we have. On the other

hand, Bickerton himself stresses the pessimistic, sociocultural reflection that language enables us to create a wide range of "dysfunctional representations" of human nature which may yet kill us all. It was not the apple that tempted Eve so much as the seductive sentiments of the serpent. □

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Purplish prose

Henry Gee

Lucy's Child: The Discovery of a Human Ancestor. By Donald Johanson and James Shreeve. Viking: 1990. Pp.318 £16.99. Published in the United States by Avon, New York. \$10.95 (pbk).

SCHOOLCHILDREN will be familiar with the class of creative writing generally described as "what I did in my summer holidays". The idea behind this literary form is to convince the reader that one has spent the vacation engaged in various improving pursuits, rather than hanging out on street corners, following the exploits of the Teenage Mutant Ninja Turtles or listening to Bon Jovi records. Typical examples of the genre inflate every routine trip to the shops into an epic voyage of discovery.

Donald Johanson had hoped to spend his summer holidays exploring palaeontological virgin territory in Ethiopia in search of fossil hominids to add to "Lucy" and the so-called "first family" — the spectacular discoveries that formed the basis of his reputation. A sequel to his bestselling *Lucy: The Beginnings of Humankind* would surely have been on the cards. But thwarted by the tides of politics, he had to make do with the well-worked and tourist-encrusted rocks of Olduvai Gorge in Tanzania instead. A fine shopping expedition was beginning to take shape.

Nevertheless, Johanson and a small crew unearthed remains of a diminutive hominid in sediments dated at 1.8 million years old. The description was eventually published in *Nature* (327, 205–209; 1987), which is not bad for a holiday jaunt. The hominid was catalogued as OH62 (short for Olduvai hominid number 62) and was interpreted in the paper as *Homo habilis* despite its very small stature and postcranial features arguably reminiscent of *Australopithecus*. To attribute OH62 as *Homo* put further strains on the validity of *H. habilis* as a single taxon (see the News and Views article by Bernard Wood which accompanied Johanson's paper). Naturally enough, much is made in *Lucy's Child*

of the specimen's attribution to *Homo*, the competing arguments, and What It All Might Mean.

But if abstruse anatomical arguments are not to your taste, *Lucy's Child* has something for everyone: there are florid descriptions of what it is like to be involved in a field season, vignettes of street life in Dar-es-Salaam and effusive pen-portraits of many of the scientists involved in the dig. The abundant flashbacks to critical moments in our understanding of human evolution framed by purplish descriptions of East African sunsets add to the impression of an uneventful amble to the drugstore made into a ten-day hike across the Siberian tundra pursued by ravening hordes of mammoths. The story starts, even, with a situation comedy: Johansen stuck in the sweltering night of his hotel in Dar-es-Salaam, paradoxically freezing cold because of a badly

adjusted air conditioning unit.

This baby-with-bathwater approach, though, falls into the classic trap of the summer holiday genre. Unless the reader is engaged right from the beginning, all these distracting details will only raise suspicions that there really is not much to write about after all. TV dinners that look so colourful tend to be, in the event, profoundly unsatisfying, and the shopping trip was, after all, just a shopping trip. Here, as with many sequels, the good bits were all done the first time round, and the rest is dressed up with special effects. Which is a pity, because, with all its faults, *Lucy's Child* is a cracking good read. Just the sort of thing to while away lazy street-corner afternoons. But not really serious enough when it's time to put away the skateboard and head back to school. □

Henry Gee is on the editorial staff of *Nature*.

The smallest continent

Jared Diamond

Mammals of New Guinea. By Timothy Flannery. *The Australian Museum (Robert Brown and Associates): 1990. Pp. 440. A\$79.95.*

The Birds of Papua New Guinea. By Brian J. Coates. *Dove Publications (Box 59, Alderly, Queensland 4051, Australia). Volume 1 (Nonpasserines): 1985. Pp. 464. US \$85, A\$110, £60. Volume II (Passerines): 1990. Pp. 576. US \$110, A\$140, £70.*

AUSTRALIA is famous for having the world's most distinctive mammal fauna, described and illustrated in numerous books. No text of evolution or comparative physiology omits examples based on those mammals. But few people are aware that the nearby minicontinent of New Guinea, with only one ninth of Australia's area, has a related but almost as distinctive and rich mammal fauna. The reason for this unawareness is simple: no comprehensive account of New Guinea's mammals has been available. That deficiency has now been filled by Flannery's book.

The book begins with brief accounts of New Guinea geology, climate, vegetation, zoogeography and extinct mammals, which included cow-sized marsupial herbivores. There follow detailed accounts of all New Guinea's 187 known extant native mammal species, including colour photographs and new field information obtained by the author. Apart from two echidna species, the mammals comprise nearly equal numbers of marsupials, rodents and bats, each group having undergone multiple radiations within New Guinea. Compared to Australia and

southeast Asia, New Guinea is notably rich in frugivorous bats, aquatic insectivores, and small arboreal folivores, and notably deficient in carnivores (only five species, none weighing over 2 kg). The differences from Australia may reflect New Guinea's smaller size, tropical location, much wetter climate and glacier-capped mountains up to 5,000 metres high. The differences from Asia reflect the inability of flightless placentals other than rodents to reach New Guinea, and the resulting radiation of New Guinea mammals to fill niches occupied in Asia by placentals such as primates and squirrels.

Mention of some New Guinea specialities described by Flannery will help convey a sense of his book. Among New Guinea's marsupials are: six species of large kangaroos that live in trees instead of on the ground; phalangiers and ringtails, the marsupial equivalent of folivorous primates; and the possum-like *Dactylopsila palpator*, strikingly convergent on Madagascar's aye-aye in possessing a very long finger used to pull grubs from rotten logs, and convergent on American skunks in its smell and bold black and white pattern. The murid rodent fauna, one of the world's richest and most highly endemic, includes giant rats weighing up to 1.7 kg, many endemic genera of herbivores and an earless rat confined to cold mountain torrents where it somehow manages to conserve body heat, catch insects and not get swept away. New Guinea's bats include one of the world's largest (a *Pteropus* flying fox with a 1.5-metre wingspan), the highly specialized and brightly coloured subfamily Nyctimeninae (unusual among Megachiroptera in being insectivores), and the tragic Bulmer's fruit bat (formerly believed extinct for 9,000 years, rediscovered alive in abundance in 1975, and re-extirminated by hunters two years later).

Although Flannery's book will be indis-

pensable to vertebrate biologists studying the Australian region, it will find a much wider audience among evolutionary biologists, ecologists, anatomists, physiologists and sociobiologists, for whom this previously inaccessible fauna extends our knowledge of the limits of mammalian adaptation.

New Guinea's endemic birds are as remarkable as its mammals and include birds of paradise, bowerbirds, mound-builders and a marsupial-like radiation of songbirds. Unlike the case for New Guinea's mammals, its birds are often cited in general biology texts and have been well served by two good modern books, the field guide by B. Beehler *et al.* (*Birds of New Guinea*: Princeton University Press; 1986) and the out-of-print handbook by A.L. Rand and E.T. Gilliard (*Handbook of New Guinea Birds*: Weidenfeld and Nicolson; 1967). Coates' two-volume treatment, of which volume 2 has just been published, nevertheless makes important new contributions. By focusing on the nation of Papua New Guinea, it includes the birds of the Bismarck Archipelago east of New Guinea, for which no modern account has previously been available. It also gathers together for the first time in book form extensive information on the behaviour of all New Guinea bird species.

But for biologists in general the most notable feature of Coates' volumes is the huge collection of colour photographs, which to my prejudiced eye includes some of the most stunning and instructive pictures of animals ever published. Especially valuable are Coates' photos of displaying birds of paradise and bowerbirds, which have been coming to the fore in recent discussions of sexual selection. Most biologists are now aware that the former have the most elaborate sexual display plumage among birds, and that the courtship bowers of the latter are the most elaborately decorated structures erected by any animals except humans. Yet the widely cited verbal descriptions are no match for these revealing photos, which will make concrete for sociobiologists the behaviours whose costs and benefits they now debate. At the risk of singling out five of Coates' photos for special mention, I suggest readers turn first to the masochistic display of Archbold's bowerbird; the belly of the twelve-wired bird of paradise — like a bright yellow light bulb carried below the bird in flight; the fluorescent blue tail wires of the magnificent bird of paradise perched over the display court that it has cleared; and the emperor and blue birds of paradise spreading their plumes while hanging upside-down from a branch. □

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