

have even observed groups of young children spontaneously create fully fledged languages. Whoever said that our ability to use language is not an adaptation?

The earliest language was probably first spoken sometime within the past 100,000 years. Nobody knows what this language was like, but it may have left traces: a few sounds seem to recur in most languages. The most celebrated is 'tik' which seems to be associated with words for 'one', 'finger' or 'digit' in many languages (toe?). Nevertheless, languages are in a constant state of Heraclitean flux and they evolve at a much higher rate than most biological traits. A rule of thumb is that a language will replace 15–20 per cent of its fundamental vocabulary per millennium with



new or non-cognate (unrelated) words. Two 'sister languages' that stem from a common ancestor acquire differences between them at twice the rate, and may become mutually unintelligible in about 500 years. Subtle differences may appear rather sooner. The English do not mind being asked what time they would like to be 'knocked-up' in the morning, but an American will blush. A conversation with the Venerable Bede would be even more challenging.

The fast pace of language evolution probably means that hundreds of thousands of different languages have been heard on Earth since humans started talking. Most of these will have either evolved into something new over time or have been replaced by a different language. But the rate at which languages become extinct may be dramatically increasing. Some linguists believe that as many as 3,000 languages will become extinct over the next century. The causes are obvious. A few languages, some owing to colonialism and trade, others to despotism, yet others to human biological fertility, have become ascendant: three-quarters of the world's population speak a language from a list of 20. Where English is spoken, typically between 80 and 90 per cent of the native languages have been lost. In Russia, some 70 per cent of the indigenous languages are moribund.

Routledge's monolithic new *Atlas of the World's Languages* provides an unprecedented account of the linguistic composi-

tion of the world. Many previous books on the world's languages have adopted the title of encyclopaedia, but this atlas is the first to provide maps showing the geographical reach of each language. Each of the 135 colour maps contains a numbered and colour-coded key. Those for the Americas and Australia record the languages as they probably were at the beginning of European colonial expansion, and as they are now. These 'time-of-contact' maps will allow scholars to investigate the way in which language groups contract, or in some cases adapt, in response to an incoming language and society. Accompanying the maps are accounts of the linguistic history of each area, probable relationships among the languages and estimates of the number of contemporary speakers based on recent surveys. Not surprisingly, a work of this magnitude is the result of the efforts of many people: Moseley and Asher assembled 14 other linguists, along with numerous collaborators, to contribute to the volume during a gestation of several years.

So large a contribution is the atlas that I predict it will stimulate its own cottage industry of geographical linguistic research. The world's Tower of Babel is the island of New Guinea with more than 1,000 different languages spoken in 310,000 square miles. Compare this to China with only 90 languages in an area 12 times the size. One of those 90, Mandarin, is spoken by 711 million people. Africa contributes about 2,000 languages, the Americas another 900, whereas Europe and the Middle East have only about 300. Maps of Australia show that more than 400 aboriginal languages were spoken at the time of European contact. Now, by my counts from the atlas's tables of numbers of speakers, at least 205 are either extinct or have so few speakers that the number is unknown. A further 150 are spoken by fewer than 30 people, an amount below which linguists consider a language not to be viable. Dividing Australia into northern and southern regions using the atlas's maps makes clear that the loss of linguistic diversity is much more pronounced in the south — the areas of greatest European settlement in Australia. In Alaska, only two language subgroups — Central Yupik Eskimo and Siberian Yupik Eskimo — are still taught to children. Another 45 or 50 native Alaskan or northern Siberian languages are either extinct or may become so in a generation.

Languages and language evolution do not depend for their own survival on the survival of their biological carriers. Like viruses infecting new bodies, elements of language can quickly jump from mind to mind, changing along the way. This is at least partly why languages evolve so quickly. But this also accounts for why a language can equally quickly displace another, even if there are no changes to

the population of speakers. The loss of any human language is the loss of a communication system as fully developed as one's own — all the different human languages are regarded as roughly equally complex. E. Sapir and B. L. Whorf advanced the idea that language structures the mind. One's language is not only the language in which one thinks, it influences the way in which one thinks. Sapir said that "we see and hear and otherwise experience very largely as we do because the language habits of our community predispose certain choices of interpretation". An English-speaking person's mind is different from that of a French speaker, and that of a German speaker, and that of the few remaining speakers of North Frisian, a phenomenon that must contribute a certain *ennui* to European Union negotiations. Sapir and Whorf were criticized for their idea earlier this century, but it has now caught the imagination of linguists and philosophers of mind.

So the loss of a language is the loss of a 'way of mind' for its speakers. The last speaker of a language (and there are many) must confront a stark and wretched isolation. The loss of a language is also the loss of a dimension of consciousness: there are 80 consonants in Ubykh and the Pintupi have at least ten words for a hole in the ground. Some linguists believe that as few as 500 languages may survive the twenty-first century. In not too many years it may be apt to describe the world as narrow-minded. □

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Diversity of life

Michael Taylor

The Common But Less Frequent Loon and Other Essays. By Keith Stewart Thomson. Yale University Press: 1994. Pp. 186. \$25, £17.95.

To some Scots (as once to Shakespeare) a loon is the young farmworker whose pre-machine lifestyle was recorded in David Cameron's *The Ballad and the Plough*. Not inappropriately, either: in this collection of essays, drawn in part from Thomson's "Marginalia" column in *American Scientist*, Thomson turns his hand from electric fish to mass extinctions to nineteenth-century zoology just as the loon (or loun) went from hay-making to swede-singling, ploughing to harvesting.

Actually, Thomson's loon inhabits not Scottish 'fermtouns' but North American lakes. Thomson, a native Briton, is now president of the Philadelphia Academy of Natural Sciences, so of course the 'common loon' is *Gavia immer*, a large and

attractive waterbird, better known to the British as the great northern diver (and hero of Arthur Ransome's children's book *Great Northern*). Thomson discusses the role of the loon, his backyard equivalent of the giant panda or tiger, as a flagship species, a marker for environmental disturbance (which is why this once Common species is Less Frequent).

Indeed, are we doing enough to fulfil our nineteenth-century predecessors' perception of the need to collect, record and then understand the diversity of nature, especially now that the rate of anthropogenic extinction is so much higher? It will do the average physicist good to see how biological and palaeontological research, too often condemned as 'stamp collecting' (itself, as Thomson notes, only too common in the physical sciences), answers and raises further profound and difficult questions. Meanwhile, Thomson's concern about the uncertain future of palaeontology (and, by extension, biological systematics), and more particularly the infrastructure of collections and taxonomic teaching and research, has increasingly been taken up into serious public debate.

Thomson himself is far from being elderly, as anyone who has met him knows. Yet it is a shock to realize that he crossed the Atlantic not in a Boeing 747 but in the *Mauretania* (a pre-1914 Cunard steam turbine liner now little more than some wood panelling in a Bristol wine bar). His autobiographical sketch of how a boy became a scientist restates the need for personal inspiration and encouragement from real teachers.

Thomson is so succinct that one is sometimes left wanting more, although this is a useful reminder of the merits of brevity. Whether one prefers his mannered essay-like style, supplemented by Linda Thomson's tenebrous drawings, to Dawkins or Desowitz, Gould or Thomas, is a matter of taste, but it all adds to authorial biodiversity. One quibble: non-scientists will enjoy most of the book, but not quite all — a nonbiologist may be defeated by the unillustrated discussion of the embryonic neural crest, that surprising marker of a true vertebrate.

Meanwhile, Thomson takes time off from the problems of science and the biosphere to take a simple pleasure in diversity. I doubt whether anyone is familiar with every topic here: the lost tree *Franklinia*, the mysterious fossil *Palaeospondylus* (fish? amphibian?) found in great abundance in just one Scottish quarry, Gilbert White, Piltdown Man, horse riding and current thinking on tetrapod origins, to name a few. Try these essays for bedtime: you can't go far wrong. □

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Beastly beliefs

Mary Midgley

Animal Minds and Human Morals: The Origins of the Western Debate. By Richard Sorabji. Duckworth: 1993. Pp. 267. £35, \$39.95. Distributed in the United States by Cornell University Press.

READERS of *Nature* will agree that it is a good thing to discover reasons for our beliefs, even when we are sure about them already. But discovering reasons can sometimes be surprisingly hard and — still more annoyingly — sometimes the reasons already given turn out to be bad ones, so that we must start the job afresh. That was what happened to Richard

can string the signs together syntactically. This is a point of the highest scientific interest but of no moral relevance whatever. (Italics added.)

The quest, in fact, turned out not to be just an historical one but a live issue. It is indeed astonishing how, when one looks at these arguments, one finds the same confusions that plagued the Greeks still present, fossilized and essentially unchanged, at the core of much present-day thinking. They still distort our ideas, not just about animals, but human psychology and our relationship with nature.

Centrally, the Greeks' tremendous exaltation of the human intellect inclined them to divorce it altogether from the physical world. This exaltation of thought has of course brought us untold benefits, including the invention of science. But it



A witch feeding familiars — "A Rehearsall both straung and true, of hainous and horrible actes committed by Elizabeth Stile, Alias Rockingham, Mother Dutten, Mother Devell, Mother Margaret, Fower notorious Witches, apprehended at winsmore in the Countie of Barks, and at Abbingdon arraigned, condemned, and executed on the 26 daye of Februarie laste Anno. 1579. London". Taken from *Animals and Human Society: Changing Perspectives* ed. A. Manning and J. Serpell (Routledge, £35).

Sorabji when he started to investigate the reasons that Greek philosophers cited for their belief that humans may do anything they like to animals. As he says:

I began my reading with only a historical interest in the large, and largely uncharted, ancient debate on human and animal psychology. But I was led to appreciate that there was a real, live moral problem by the badness of the arguments for a major difference between animals and man. It sounded grand enough when Aristotle and the Stoics declared that man had reason and animals had not. But, as the debate progressed, it began to appear that animals might lack only certain kinds of reasoning, and a stand was taken on their not having speech. When this defence too began to be questioned, a retreat was made to the position that they lacked syntax. 'They lack syntax, so we can eat them,' was meant to be the conclusion. It was amazing to find that modern discussions had reached exactly the same point as the ancient ones. . . . The debate on the ability of chimpanzees to use sign language has come down to the question whether they

distorted the view held of our own species. It moved *Homo sapiens* away from his shaky, midway status between beasts and gods into a closer and much more ambitious alliance with the latter. Human reason, now hailed as divine, increasingly tried to distance itself from its poor relations both in other human faculties and in the outside world. Any mental likeness between humans and animals, which still formed the irremovable lower pole of the contrast, embarrassed this attempt terribly. Likenesses, therefore, were strenuously minimized.

Sorabji shows how this bias led even Aristotle, who as a biologist stressed the continuity between all lifeforms, to make unreal distinctions between the obviously intelligent behaviour of some animals and very similar behaviour in humans. Using the Greek equivalent of modern shudder-quotes, Aristotle kept ruling that such likenesses must somehow be just analogies. Here, already, the concept of reason