In this issue

Animal behaviour

The origins of the study of animal behaviour lie in the general curiosity about nature and natural history. Around the middle of the twentieth century, Konrad Lorenz, Niko Tinbergen and Karl von Frisch systematized such studies, and established an independent discipline of Ethology. Ethologists asked four basic questions about behaviour: What is its function?, How is it caused?, How does it develop? And how did it evolve? In the 1960s and 70s, William Hamilton and Robert Trivers provided a new perspective to look at animal behaviour, especially social behaviour, as a trait that enhances 'inclusive fitness'. In 1975, Edward Wilson (*Sociobiology: The Modern Synthesis*) synthesized animal behaviour and the theory of inclusive fitness. The investigators in this field now have a clear theoretical framework. This framework consists of looking at proximate mechanisms that appear to determine behaviour, and an ultimate evolutionary reasoning to explain behaviour as a product of natural selection. The research with this perspective encompasses animal systems from microorganisms to primates (and humans). On the side of application, there has often been a criticism that typical studies on animal behaviour have no relevance for the conservation of habitats and animals. However, the researchers in the field of animal behaviour now bring out the application of their findings for the management of animals both in the wild habitats and in captivity.

During the past few decades, Indian scientists have made significant contributions in the field of animal behaviour. This has happened as there is a large trained scientific manpower in the country, and there is enormous diversity of animal life inhabiting a variety of habitats. This has provided an excellent opportunity for a blend of theoretical, laboratory and field research on animal behaviour in India.

This Special Section has been planned keeping in mind the diversity of issues and animal systems in behavioural studies. The first few articles deal with issues concerning proximate processes including cognition (D. Candland), behaviour genetics (A. Joshi) and physiology (V. K. Sharma and M. K. Chandrashekaran, and R. Balakrishnan) The article by A. Sinha *et al.* discusses the role of ecological factors in shaping social behaviour. B. Thierry makes another attempt to integrate proximate and ultimate causation. The second part of the Special Section contains articles on behaviour in a variety of animal systems including parasites (M. Jog and M. Watve), ungulates (K. Isvaran), elephants (T. N. C. Vidya and R. Sukumar) and primates and bats (R. Radhakrishna). A. Mallapur, S. Quader and M. Singh and W. Kaumanns discuss the application of animal behaviour studies for conservation and management.

Co-seismic deformations

The earthquake that occurred on 26 December 2004 was an unprecedented event in the recent history. It is now known that a massive displacement along the submarine fault at the eastern boundary of the Indian tectonic plate, along which the inexorable process of subduction conducts itself by dragging the Indian lithosphere into the deep trench, generated this earthquake. The earthquake attracted global attention also because of the devastating tsunami that formed in its wake. Ever since, the earthquake scientists are attempting to understand the mechanism of the processes that resulted in one of the deadliest natural disasters in the history. There are many questions that remain to be resolved. Some of them are: (a) Was this a single event or a compound event consisting of several rupture episodes? (b) Was this event characterized by uniform rupture speed? (c) What would be the nature of stress accumulation in the region before this earthquake (and after) and why such a large amount of stress remained unspent along this zone, despite the previous large local earthquakes? (d) How would other segments in the north and south of the present rupture zone behave in terms of earthquake generating processes? (e) Other than the simple models of plate convergence and its rate, what would be the driving role of physics, chemistry and the structural aspects of the subduction zone itself, in generating such earthquakes? (f) Are these earthquakes periodic or do they occur in an irregular fashion? (g) What are the factors that control the generation of tsunamis, (h) What is the nature of pre-, co- and post-seismic crustal deformation and how is this related to the earthquake and volcanic cycles in the region? Finding solutions to these problems based on a varied set of data are important to develop future scenarios in the region and other areas in the world like Cascadia in the northwestern United States and parts of the Japan, east Pacific and Latin American coast. Earnest *et al.* (**page 1237**) present some remarkable near-field GPS measurements and field observations that will provide the basic input for modelling the nature of deformation along this important plate boundary; a definite contribution to the ever expanding knowledge base of this intriguing earthquake.

E–W shift observed in the span of Panighat bridge near Diglipur

Field ion microscope

This year marks 50 years of achievement of atomic-scale resolution using the Field Ion Microscope invented by E. W. Müller. The impact of this achievement and the developments it engendered, are all-pervasive in fields like materials science, surface science, nanotechnology and biosciences. In a note (**page 1280**), the initial set of experiments that led to the first image of atoms on tungsten tip has been described. The note brings out an interesting but little known fact that an Indian scientist, Kanwar Bahadur, made key improvements in the apparatus, which enabled the atomic resolution possible.