In this issue

The state of our knowledge (and ignorance) about biodiversity: The Good Lord explains

Almost every reader of *Current Science* knows by now that conserving biodiversity is very important – though he or she would have successfully (and perhaps, justifiably) avoided wading through the innumerable articles on the subject that somehow continue to be published in many science journals. However, most people would have only a vague idea of the precise issues involved in biodiversity conservation, of what is known, what needs to be done, what can be done, etc. Reading the article on **page 1325** of this issue, where Robert May provides a crisp, lucid and comprehensive summary of the current state of our knowledge and ignorance on the subject, would be one of the best ways of learning about this important topic.

May begins his article with three easily posed questions: (1) How many species of organisms have been recorded by science; (2) how many species are present on the earth today, and (3) what is the current rate at which species are becoming extinct. After giving a highly readable account of the several different methods of estimating the total species pool, he gives his best guesses for the answers. Particularly interesting and amusing are the comments on the relative efforts being spent on the different taxa – birds vs plants vs insects, for example. His preferred answer to the second question is about 10 million species (from the range of 3 to 30 million, reported in the literature). This estimate will inadvertently gladden the hearts of those who believe in the superior scientific knowledge of the ancients – the holy books of Jains, Sikhs and Hindus have always quoted a figure of 8.4 million life forms being present on the earth. (At least, that is what you find when you search the Internet for 'eighty-four lakhs' using Google or any other search engine!) On the other hand, the scientists who are disheartened at our high level of ignorance of the extinction rate will be appreciative of the ingenious method of improving the precision by estimating relative extinction rates described by him.

While it is tempting to go on describing the nuggets scattered throughout the article (like the joy of 'scoring off a friend', or of quoting about 'every singer worth her faded jeans'), I would leave it to the reader to find his or her own favourites in the article. Not to be missed, however, are the thoughts on costs, concerns, utilitarian and ethical arguments, and above all, the need for 'deep regret and powerful hope . . . to guide effective action'. May's logical, pragmatic and sensitive analysis of the issues of development versus conservation, conveyed with a combination of gentle humour and thought-provoking seriousness makes this article very appealing to a much wider audience.

N. V. Joshi

White spot syndrome virus

With $ 30 billion investment on global aquaculture by 150 countries which practise aquaculture, and with more than 10% annual growth rate, contribution to fish production through aquaculture is 36 mt, worth $ 50 billion; Asia's share to this production is 91%. In India, about 100,000 ha has been brought under aquaculture during the last decade to produce about 82,000 tonnes shrimp by small and medium farmers, with the necessary hatcheries and processing plants at a total investment of about Rs 7 billion. India exports 0.4 mt shrimps worth $ 1.2 billion. Hence, capture and culture of shrimps is a highly productive sector, a source of valuable food and employment, and a net contributor to settlement of balance of our payment.

A major constraint for the development of aquaculture is the loss due to diseases. The estimated annual revenue loss to developing Asian countries is in the range of $ 3 billion. Viral diseases cause acute and heavy mortality. Among them, white spot syndrome (WSS) is the most serious one; it was first reported from *Penaeus japonicus* in 1992 from Taiwan. In the following couple of years, the most devastating reports were recorded on the viral infection in *P. japonicus* and other penaeid shrimps from Asian countries like Japan, Thailand, China, Korea and India. The causative viral pathogen has been named differently by scientists. However, presently all these viruses are collectively referred to as white spot syndrome virus (WSSV). Generally, viruses are host-specific, but WSSV has a very broad host range and has been detected from a variety of crustaceans, including crabs, lobsters, palaemonid shrimps and even copepods and aquatic insects (Lo *et al*., *Lett. Appl. Microbiol*., 1996, **22**, 413). WSS is acutely pathogenic to penaeids but not to other animals, including palaemonid shrimps, and all of them serve as carriers and reservoirs. Therefore, containing this virus is more complicated in an ecological sense.

Gene probes and DNA amplification using polymerase chain reaction have been widely applied for detection of the viral infection in shrimps. In India, I. Karunasagar and co-workers were perhaps the first to report the occurrence of WSSV in penaeid larvae. On **page 1392** of this issue, they report the occurrence of WSSV from a large number of captured crustaceans, collected from landing centres and fish markets, along the east coast and west coast of India, choosing Kolkata, Chennai, Thiruvananthapuram, Mangalore and Mumbai. Unfortunately, 77 out of 89 crustacean samples examined by them prove to be positive for WSSV. Annoyingly, the list of reservoir species appears to be fast expanding; this communication alone lists four more species, which are found positive. WSSV is also present in wild broodstock of *Penaeus*. Therefore,

this communication presents an idea about the heavy damage to the Indian shrimp culture that the virus is capable of. Whereas Thailand and China have positively responded to contain the outbreak of viral diseases, India has not yet embarked on any massive programme to contain the virus and save shrimp culture.

T. J. Pandian

Neem: A therapeutic for all seasons

A variety of neem products have been advanced as potential therapeutics for a diverse range of ailments. Kausik Biswas and co-workers review (**page 1336**) the diverse uses of this medicinal plant.

The authors list 21 bioactive compounds with potential therapeutic value. Apparently more than 135 compounds had been isolated from the products of the neem tree, the first interesting compounds being nimbin, nimbinin, and nimbidin reported in 1942. Salimuzzaman Siddiqui, the pioneer natural product chemist, then working in the Scientific and Industrial Research Laboratory at the Delhi University, extracted these three bitter compounds from neem oil, by extracting the water insoluble components with ether, petrol–ether, ethyl acetate and dilute alcohol. These three bitter components were provisionally named nimbin (sulphur-free crystalline product melting at 205°C, empirical composition $C_7H_{10}O_2$), nimbinin (similar bitter principle but melting at 192°C), and nimbidin (cream-coloured amorphous sulphur-containing, mp 90–100°C). S. Siddiqui (*Curr. Sci.*, 1942, **11**, 278–279) identified nimbidin as the main active anti-bacterial ingredient, and the highest yielding bitter component in the neem oil. Since then, neem has been a popular topic of discussion among the herbal chemists. Fifty years later, T. R. Govindachari reviewed the literature on the anti-feedant and insecticidal properties of azadirachtin isolated from neem seed kernel extracts (*Curr. Sci.*, 1992, **63**, 117–122). Various chromatographic techniques could be employed to obtain pure azadirachtin (mp 160°C) and its three-dimensional structure is known from X-ray and NMR investigations.

Biswas *et al*. cite ancient medicinal use of eight parts of the tree (leaf, bark, flowers, fruits, twigs, gum, seed pulp, oil, and their combinations) as recommended in the Indian Ayurvedic literature. In addition to the shade, breeze, and pest-resistant timber, 'Sarbaroganibarini' neem generously contributes each and every part of its body as suitable for human consumption. Despite being a 'village dispensary', neem remained neglected for a long time in the Western Pharmacopia and formularies, primarily because of lack of enough documentation on toxicity and side effects on human and other animals using modern methods. Among the commercial products, perhaps, neem soap and toothpastes are easily available; fresh twigs of the tree are used for brushing teeth by the villagers. Among the 13 beneficial pharmaceutical activities listed by Biswas *et al*., some are as common as anti-pyretic analgesic, anti-malarial, others are as fashionable as anti-oxidants that are part of every western diet. Some are neuro-depressants, others are immunostimulatory. Some are anti-carcinogenic suppressing the growth of squamous carcinoma, others are protective against necrosis in the liver cells. Oils and extracts may also be used as anti-fertility drugs.

With so much of work, that corroborates claims made in the Ayurveda, what is the net outcome? What is the demand for such chemotherapeutic agents? What are the commercial alternatives now available over the counter? Will neem products ever really replace competitive products? Will the 'village dispensaries' survive as independent isolated sources, satisfying rural medicinal needs in each village? Or will the multi-national corporations require large commercial farming for a steady supply of the neem-based products? Neem products hit the popular media headlines only after it became the subject of a legal controversy when the European Patent Office rejected a patent application from the WR Grace Company and the United States Dept of Agriculture. This verdict in 2000 reversed an earlier decision granting the right to patent a process using the neem oil for fungicidal purposes. Lobbyists in Europe and India argued that such patenting violated the rights of the farmers in the third-world countries, who use traditional knowledge to earn their livelihood. Such action had been dubbed as biopiracy by lobbyists (http://www.twnside.org.sg/). No data on commercial neem plantations in India are available. Govindachari cites a large plantation of 50,000 neem trees near Mecca that is to provide shelter for the pilgrims. He estimated a net annual production of half-million tons of seeds in India. Reports of surveys of neem plantations in Australia are published. The survey concluded that the commercial plantations were not significant, and that the neem industry was not commercially profitable in the medium term in Australia (http://newcrops.uq.edu.au/; http://rirdc.gov.au/).

S. Ganguli