

CORRESPONDENCE

Physiology and overcrowding

The commentary 'Physiology and overcrowding' by P. Balaram (*Curr. Sci.*, 1998, 74, 492) was appetising enough for me to read the paper 'Influence of group density and sex ratio on the immune response in the tilapia *Oreochromis mossambicus* (Peters)' by Ravikumar and Michael (*Curr. Sci.*, 1998, 74, 534-537). While I found the design of the experiments interesting, I was disappointed to see serious loopholes in the presentation and interpretation of the results. These are listed as follows:

- (a) Even as sex ratio has been demonstrated to govern immune response (Figures 2-6), the sex ratios of the animals used in Figure 1 have not been stated. If the animals were picked up at random, the unstated sex ratios in Figure 1 could have been 1:1. But if such were the case, the effect of group density on immune response would not be manifest as the results shown in Figure 6 would suggest.
- (b) Every figure legend deals with immune response to 'S-BSA'. But the prefix 'S' in the absence of any explanation has remained elusive throughout the paper.
- (c) In Figure 4 even as the legend suggests the experiment to be female dominant, the figure itself shows equal numbers of males and females, viz. 20 each. I guess this should have been male (10) and female (20).
- (d) In Figure 6, the symbols used in the graphs have failed to be indicated

against their captions. This does not allow the reader to correlate a graph with the group it represents.

- (e) A new branch of science can give new interpretation for old observations. However, new awareness cannot account for the contradiction in results seen by different investigators as long as the experiments have been done in the same way. Therefore, to say that the immunosuppression seen by Pelmutter *et al.* (1993) and by Mcleay (1975) vs the immunostimulation seen by Ravikumar and Michael in 1998 can be rationalized by the new branch of psychoneuroimmunology is not correct. As a matter of fact, the proposed theory of pheromones to explain immunomodulation with group density lacks credibility. The authors must demonstrate that a volatile immunostimulant in tanks overcrowded with fish can stimulate immune response in fish living at low density. An elegant intercolony communication system in yeast and its even more elegant experimental investigation is worth seeing in 'Ammonia mediates communication between yeast colonies' (Palkova *et al.*, *Nature*, 1997, 390, 532).

I hope the authors will come forward with the true mechanisms for their exciting observations as also for the contradictions between their results and the ones described in previous literature.

The editorial vigilance of *Current Science* needs to be kindled.

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Editors' note: The editors stand chastized.

Authors' response:

- a) For the preliminary experiment to see the effect of group density on immune response, the fish of the same size were picked up at random. The results shown in Figure 1 surprised us because we expected (as reported earlier by others) an inverse relationship between group density and magnitude of immune response. In fact, this unexpected result motivated us to analyse the possible reasons and to conduct the sex ratio experiments, after certain months. Since the fish were immediately sacrificed after this experiment, we were not able to identify the sex. Probably the sex ratio might have been all male or male dominant ratio (since normally 75 to 80% of the fish in a lot supplied will be males).
- b) Expressions such as S-BSA and HA-BSA which represent Soluble BSA and Heat Aggregated BSA respectively, should have been explained

- c) There was an error in Figure 4. The numbers male (10) and female (20) should have been indicated.
- d) The absence of symbols near the captions in Figure 6 is again an inadvertent error. The symbols defined in Figures 2–5, have been used throughout for males, females and controls, respectively.
- e) The contradiction is that earlier workers reported immunosuppression during crowding whereas we show enhancement during crowding and this enhancement has been related to sex ratio. The earlier workers perhaps have not controlled the sex ratio. Psychoneuro-

immunological basis for the sex ratio-related immunomodulation is a possibility. That is why we have mentioned 'The interpretation of the contradicting findings in the present study *perhaps* lies in terms of psychoneuroimmunology' (*perhaps* = possibly or maybe). Also, we have mentioned that enhancement of immune response is 'possibly' due to certain (sex) pheromones... We have not mentioned anything categorically since the basis is not clear at the moment. The authors have also admitted that conclusive evidence for the role of pheromones can be given only after

getting more information on fish pheromones.

We thank the reader for pointing the avoidable inadvertent errors in the presentation but we do not agree that the points raised are 'serious loopholes' in the study which require kindling of editorial vigilance of *Current Science*!

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NEWS

Synchrotron radiation in science and technology*

The Abdus Salam International Centre for Theoretical Physics (ICTP), Trieste, is a rather unusual UN Institution on the Adriatic Coast of Italy just outside Trieste. ICTP offers every year, an unique opportunity to do research at regular intervals and, most of all, a place to think, talk and work. ICTP has a programme of organizing summer/winter/extended schools, colleges in frontier areas of science and technology in order to encourage scientists in taking up challenging R&D activities in front-line subjects and to act as a bridge between the scientists of developing and the developed countries.

The John Fuggle memorial Synchrotron Radiation (SR) school is a bi/tri-annual affair and named in memory of John Fuggle, who was instrumental in holding the first SR School to discuss about the possible exciting applications of SR and also giving training to young scientists all over the world so as to enable them to take up challenging tasks applying SR. Unfortunately Fuggle lived no longer to see his dream comes true and expired due to cancer at the age of 48 years before the first SR School started. In order to pay tribute to his

memory, the Schools on SR were named after John Fuggle and are being held regularly bi/tri-annually.

The basic objective of the ICTP SR School demonstrates how the users/potential users of this source of radiation, i.e. SR are finding applications in an increasingly wide variety of fields of science and technology. The field of SR research and applications is making rapid strides and specialized applications in this area are expanding correspondingly. The objective of the ICTP school was to provide an up-to-date account of the recent impact and ongoing developments in the area of SR applications. I, personally, thank the organizers of the SR school for giving me an opportunity to participate and I also believe the various topics covered are the most comprehensive treatment of SR to date.

In all, six directors who are experts in their respective fields were there to guide and coordinate the activities of the School. Eighteen guest faculty plus six directors gave nearly 75 lectures as originally planned. There were informal seminars amongst the participants so as to interact and explore common areas of interest. In addition to the lectures/seminars, visits to Sincrotone Trieste were organized to record the spectrum

as well as familiarizing oneself with the various beam lines. Substantial time was devoted to tutorials. Data analysis/reduction was imparted to the participants which was immensely beneficial for participants to follow up in their respective countries.

Synchrotron radiation

An immense range of new technologies associated with the selection of photon energy and polarization and with diffraction, scattering, spectroscopy time resolved studies and imaging has evolved from the use of SR. The interaction between different technologies has led to a very substantial 'tunneling' through the old 'potential' barriers between the disciplines of physics, chemistry and biology, resulting in a multidisciplinary and multiple techniques approach to the solution of scientific problems. Throughout the 1970s and 1980s, SR research probably gave a lead by this fresh approach to science which is now so essential to success in basic and applied research. There is hardly any area of science that has not benefited from SR.

X-rays penetrate all forms of matter – solid, liquid and gas – and are scattered

*Based on the ICTP SR School held from 3 November to 5 December 1997 at Trieste.