MATTERS ARISING

Sensory cues invalidate remote viewing experiments

TART, Puthoff and Targ[1] have recently responded to our critical analysis[2,3] of their evidence in favour of extrasensory remote viewing ability by reporting a re-judging of the original transcripts with all sensory cues removed. This yielded a high correlation between Price's descriptions and the target information. Furthermore, Tart *et al.* claim that the Marks–Kammann cueing explanation of remote viewing does not apply in principle to any of the replication experiments carried out after the series with Price.

The validity of the re-judging exercise for the Price series can be disputed on two counts. First, it should be noted that the editing of transcripts was carried out by one of the investigators (Tart). As Tart was himself aware of the correct target–transcript pairings, this could have led to biasing. Second, it is not permissible to include material for re-judging which has already been published or which may be available in some other form. A so-called 'blind' judge may have some memory of previously seen target–transcript matchings or have access to the published material. Only five of the series of nine targets and transcripts for which there is no normal or available method of matching except perceived similarity, could validly be used in re-judging. The remaining four transcripts should have been excluded, as in the unsuccessful re-judging exercise reported by us[2].

A much more serious problem with the response of Tart *et al.*[1] to our report is their claim that sensory cues were not present in later experiments. Unfortunately, I have been unable to obtain a complete set of transcripts from SRI investigators despite frequent requests. However, in June 1977, Dr Arthur Hastings, who was a consultant to the SRI investigations responsible for judging experimental transcripts, allowed me to see six transcripts from the series with the subject H. Hammid, and I was far from satisfied with them as they contained sensory cues. A listing of targets in Hastings' possession correlating 0.83 ($P < 0.01$) with the order of target usage, together with transcript cues, would have provided an artefactual basis for correct target–transcript matchings.

Although Tart *et al.*[1] conclude that SRI replication studies confirm the remote viewing hypothesis, serious methodological flaws throughout the experiments prohibit any such conclusion. The Targ–Puthoff researches conform to a long history in parapsychology of methodological flaws and mistaken conclusions. Unless proper controls and methods are used by impartial observers, the search for scientific proof of paranormal and spiritual beliefs remains a futile enterprise.

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Micrograzers may affect macroalgal density

THE EFFECT of density on plant growth and mortality has been recently discussed by Schiel and Choat[1]. Studying two species of large brown seaweed, *Ecklonia radiata* and *Sargassum sinclairii*, they found that high density had a positive effect, in contrast to data for terrestrial plants. They concluded that density affects marine and terrestrial plants differently, and suggested that these differences were due to protection from wave shock and the difference in plant–arthropod associations between terrestrial and marine environments. Uninjured brown algal thalli contained up to 1,700 copepods, amphipods and isopods.

Terrestrial plant density has a limiting effect on nutrient and water supplies to the individual plant that would not be expected for algal density, but we believe that the data for *Sargassum* and *Ecklonia* communities[1] are exceptional and subject to reinterpretation. Specifically, conclusions on the general effect of density on marine plants should await data from algae typical of less exposed communities.

Our work on amphipod grazing in the field and in the Smithsonian Institution's coral reef microcosm demonstrates that coarser algae (for example, *Hypnea*) are protected from amphipod grazing by their size, but most filamentous species are heavily grazed[2]. By eliminating epiphytes on coarser algae, amphipods increase growth rates of macroalgae such as *Hypnea* by as much as 300%. In subtidal areas, amphipod densities are kept low by fish predation[3], but in situations where this is reduced by factors such as turbulence, micrograzer herbivory may be particularly important. Such high energy areas are characteristic habitats for brown algal macrophytes. Up to a point, densely growing *Ecklonia* and *Sargassum* plants would shelter more amphipods from predation. This would contribute to a positive effect of high density on these seaweeds, while being equivalent to a locust attack in its effect on many other algal species.

Schiel & Choat[1] suggest that the study of marine plant–arthropod relationships could have important implications for mariculture. In fact, our work on amphipod grazing implies that maintenance of some amphipod species in mariculture facilities could increase yields significantly.

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SCHIEL AND CHOAT REPLY—Our recent paper[1] reported two of our findings for large marine algae: (1) individual plants in dense, monospecific stands tend to be larger compared with plants of the same age in sparser stands, and (2) the number of crustacea in algal fronds may be quite high with no apparent adverse effect on algal plants. We contrasted this to terrestrial plant systems, where the opposite seems to apply in both cases. These observations were put forward as hypotheses worthy of further testing.

An experimental demonstration of a link between fish predators, frond-dwelling crustacea and the occurrence of epiphytes on large brown algal plants has proved largely intractable in field situations. Data on the comparisons of arthropod loads between densities and exposures of plants, the fish effect on arthropod loads, and the effects of arthropods on host plants are either lacking altogether or equivocal, particularly over large areas generally. Brawley and Adey[2] have provided evidence in their coral reef microcosm that such a link exists, and that high numbers of crustacea may be of benefit to larger algae by reducing epiphytism. Their results do not negate our hypotheses. Our argument admits the likelihood of a beneficial effect on plants, or no effect at all, due to crustacean loads. However, before a general case is made more data are required concerning: (1) the general effects of density on growth, survival and size of marine plants; (2) the effects of crustacea on marine plants, and (3) the effects of fish predators on crustacea. Brawley and Adey have provided some information. We welcome further testing of the hypotheses we have put forward.

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0028-0836/81/280177—01$01.00