

bandry is just around the corner.

The congress was not concerned solely with mammals from the Soviet Union, nor just with ecology and production biology. About 1,000 zoologists from many countries of the world took part in a range of seminars and symposia which covered topics such as zoogeography, evolution and taxonomy, endocrinology and gestation, growth physiology, ethology, orientation and signalling, and the problems to be overcome in conserving bears and marine mammals. The USSR Academy of Science (see *Nature*, **249**, 502; 1974) organised the meeting in its 250th anniversary year. The congress has significantly fostered a closer spirit of interaction and cooperation between Soviet and Western zoologists than has hitherto been the case.

Antibody manipulation by malaria parasite

from F. E. G. Cox
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WITH more than one thousand million potential malaria victims in the world it is not surprising that considerable attention has been paid to possible methods of vaccination against this disease. All the attempts so far, however, have been relatively unsuccessful. All have involved killing or attenuating malaria parasites and using large amounts of antigen. Even then, the results have been variable and protection has been limited. Many workers believe that vaccination against malaria is not possible because of the existence of antigenic variation and cell mediated responses as yet unrecognised. In fact, much of the basic information necessary for the development of a vaccine is already available and it may well be that investigations of antigenic variation and cell mediated responses are irrelevant to immunity to clinical malaria.

Immunity to malaria can be explained in terms of an antibody directed against the merozoites while they are outside the red blood cells. The evidence for this comes from three sources. First, *in vitro* experiments carried out by Cohen and his colleagues at Guy's Hospital Medical School have demonstrated that parasites within their red cells take up ³H-leucine in the presence of immune sera as well as they do in normal sera (*Trans. R. Soc. trop. Med. Hyg.*, **65**, 125; 1971) but that in immune sera the invasion of fresh blood cells is inhibited. They have also shown that merozoites bind to suitable cells (*Nature*, **244**, 40; 1973) and the prevention of this binding by immune

sera could form the basis of immunity. Second, Jerusalem, Weiss and Poels, in a paper that has not received the attention it deserves (*J. Immunol.*, **107**, 260; 1971), showed that fluorescein-labelled antiserum injected intravenously into mice bound only to merozoites and not to intracellular parasites. Third, nobody has observed any damage or signs of changes in parasites within their cells during the immune response.

If it is only the merozoites that are important in immunity, why is it that the antibodies associated with antigenic variation agglutinate infected cells? Part of the answer to this question comes from the work of Brown (*Nature*, **242**, 49; 1973) and Brown and Hills (*Trans. R. Soc. trop. Med. Hyg.*, **68**, 139; 1974). They have found that in *Plasmodium knowlesi* infections in monkeys, infected cells are agglutinated by a non-protective antibody that is easily separated from an opsonising antibody associated with protection. Brown postulates that the agglutinating antibody serves to trigger a switch in antigens and this change allows the parasites to survive in what should have been an immune host. In other words this antibody has been manipulated by the parasite for its own ends. The opsonising antibody is important in protection and is effective against all antigenic variants and the relative rates of synthesis of these two antibodies determine the outcome of the infection.

The protective immune response to malaria is weak and largely ineffective and it is unlikely that any vaccine could produce a better immunity than the natural one. Nevertheless, acquired immunity to malaria does occur and children who survive the first few years of their lives in malarious areas tend to be immune to clinical malaria if not to the infection itself. A vaccine that could be used to see children through their first few years would be invaluable. There is no evidence to suggest that cell mediated responses are important in immunity to malaria so the induction of an antibody against merozoites could well be effective. Possibly all that is required is the antigen involved in binding merozoites to their host cells. As antigenic variation involves an antibody that has nothing to do with protection it is unlikely that antigenic variation would interfere with any protection produced as a result of vaccination against merozoites.

Correction

In the News and Views article "Biogenesis of surface membranes" (*Nature*, **249**, 414; 1974), Dr G. Kreibich's name was misspelled in the penultimate and last paragraphs.

Anthill and tiger counting in the Soviet Union

from Vera Rich

JUDGING from the numerous Soviet press and agency reports, one of the major tasks of Soviet ecologists and conservationists is the taking of censuses of various species of wild life. This applies not only to those species threatened by extinction, but of any that are or might prove of value to the economy. Thus the 1972 census of ant-hills in Estonia was undertaken, not because the Estonian ant was in imminent danger of disappearing, but because it had been found that an optimum of 3-6 anthills per hectare in stands of timber checks the multiplication of various forest pests. Similarly, the census currently being taken of sables in the Amur taiga will be used for improving the system of distributing hunting licences. Even in the case of threatened species, practical advantages are remembered: the Black Sea dolphin census (1971), which revealed that the dolphin population had doubled since the ban on hunting was introduced in 1965, evoked the remark from its director, A. Chepurinov, at a press conference: "The time is not far distant when dolphins will be used to drive fish into nets, to carry out marine rescue operations and to communicate with underwater laboratories".

The census-taking methods vary considerably in complexity. Counting anthills is a relatively simple task, which could conveniently be delegated to students as part of their practical work, but the estimation of most species is much more difficult. The latest (1973) Black Sea dolphin census, which gave a total of 800,000 (three times the 1965 figure), required aircraft and seagoing ships and took 3 months to complete. The grandiose estimation of the total dry-land flora of the world, carried out by the Botanical Institute of the Academy of Sciences of the USSR, giving a total 2,625,000 M tonne of phytomass, presumably involved satellite data. Sometimes a quantitative result seems impossible to obtain. In the case of the jeiran (a variety of antelope) of southern Tadjikistan, although "large herds" are now reported where, before protection, only a few isolated specimens were observed, no figures, either absolute or relative, seem to have been established. Presumably, so far, no reliable method of counting them has been devised.

The same difficulty, it might be thought, would arise in the census of Amur tigers made from 1971-73 in the Primor'e region of the Soviet Far East, but an ingenious solution was found—